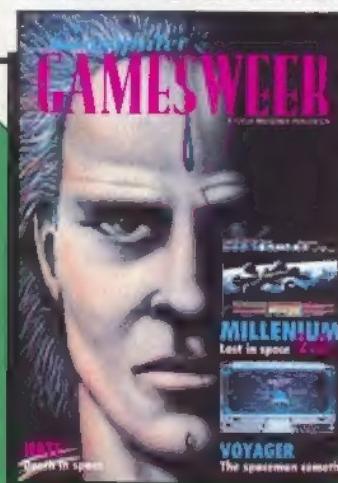


POPULAR COMPUTING

INCORPORATING GAMESWEEK

70p WEEKLY

MAY 18 1989



IN GAMESWEEK

MILLENIUM

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FREE
AMIGA
SPECIAL!
p.21-36

WIN AN A500!

SPECTRUM

- An exclusive preview of MGT's Spectrum compatible SAM micro.



AMIGA

- In our amazing supplement:
- 32-bit expansion
 - IFF files explained
 - Video titling
 - Databasing
 - Professional Page
 - WPs

H.A.T.E.

ARCADE ACE

PC COMPATIBLES

- IBM's luggable PS/2
- Philips' PC fax offer
- Tulip, Goupil portable
- Takeaway simulator

AMSTRAD CPC

- Type in our character scrolling program that will allow you to heighten text on-screen. See Bytes, p.37



ACORN SAYS IT'S A 'ROLLS ROYCE'!

● IBM'S JAPANESE TAKEAWAY, p.2



FIRST NEWS AND REVIEWS IN BRITAIN'S MOST COLOURFUL WEEKLY



IBM luggable is a Japanese take-away

IN A MOVE which stunned assembled PC pundits IBM announced its first portable computer since its lacklustre Portable PC and PC Convertible products failed to take the market by storm three years ago.

The new machine is a 20lb luggable - made in Japan by Matsushita - dubbed the P70-386, and is a full-function PS/2 model 70, based on a 20MHz 80386 microprocessor. IBM arch rival Compaq launched an 80386-based luggable eight months ago - IBM claims its customers are only now beginning to demand this kind of product.

The P70-386 system RAM is set at 4MB, expandable to 8MB; two versions of the machine will sell with either 60MB or 120MB hard disc units. Like all PS/2s the P70-386 is compatible with the Micro Channel expansion bus, DOS and OS/2. There are three MCA expansion slots.

While IBM is pushing the machine as a "no-compromise" Model 70 in portable form, the 6in. x 8in. display provides 16 monochrome shades on an amber plasma panel display but the machine will drive a VGA monitor

directly. Unlike many portable PCs, the 3.5in. disc drive is not exposed to rain, wind and snow when the machine is fulfilling its portable vocation. The drive is instead installed vertically be-

side the display and hinges outwards from the top.

Like some other 80386-based portables, the P70-386 cannot work from batteries. IBM reckons most Model 70 PS/2 users will want to work at home or in their designer offices and not somewhere between. For design-conscious users, IBM had curious words of comfort: "The P70 is not black or grey - it is white and looks great in an office" said one of the firm's U.K. technical chiefs, Dr David McAulay.

Prices for the machine - with no DOS or OS/2 included - have been set at £5,387 (60MB hard drive) and £5,819 (120MB); availability is a little woolly, but dealers "will have demonstration versions in May." IBM U.K. is on 0705 321212.

- In addition, IBM also launched two new PS/2 micros based on the 80386 SX, the 16/32-bit Intel processor. The 2MB 555X micros come in 30MB hard disc and 60MB versions, for £2,557 and £2,786, and provide better than PC AT performance for similar prices.

Paul Marks



Striding off into the sunset with the IBM portable.

Labour opts for Opus

THE DIRE prophecies of TGWU Secretary Ron Todd of "Filofax Socialists" could soon be reality, if the PC User Show is any criterion. The Labour Party has chosen Opus Technology to supply the new PCIII/20 personal computers to its Walworth Road headquarters and area offices.

The "Red Rose" computers will be offered by the Party to its 300,000 members and 7,000 affiliated organisations. Bryan Gould, Labour Trade and Industry spokesman, was at the PC User Show to set the seal on the deal, accompanied by Josh Benn, son of Tony Benn.



Opus comes up roses for Bryan Gould and Josh Benn.

Printer frenzy at Olympia show

THE PC USER Show was the scene of several new printer launches from Star, Epson and Brother.

Star launched its Professional Series, which was covered in *Popular Computing Weekly* last week. Epson introduced two printers capable of seven-colour printing, the 80-column LQ860 and the 132-column LQ1060. The print rates vary from a super draft speed of 290cps to letter quality print of 88/75cps. A 6KB buffer can be used to store up to 128 separately-defined characters. The LQ860 and LQ1060 are priced at £769 and £959.

A new range of 24-pin letter quality printers and a new 18-pin dot matrix printer were launched by Brother. The 1224 is an 80-column printer with a speed of 45cps and a draft speed of 162cps. It retails for £385.

The 1824 has a draft speed of 270cps and a letter quality speed of 90cps. It



The new Brother 2524 which was shown at the PC User Show.

will be available next month at £595. The 2524 has a draft speed of 360cps and a letter quality speed of 120cps. The machine features a straight-through paper path enabling it to handle envelopes, thick card and adhesive labels. It will be available in August at £995. Mannesmann Tally demonstrated its MT91 ink-jet printer and MT81 models.

Contacts: Star - 01-840 1800, Epson - 0442 61144, Brother - 061 330 6531, Mannesmann Tally - 0734 788711.

This Week

SAM PREVIEW p.8

John Wase gets a sneak preview of the Basic implemented with MG's new micro.

HOTLINES p.10

Duncan Evans manages to talk about software this week - just for a change.

PUZZLE p.10

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COMMODORE AMIGA SUPPLEMENT LOGOS FOR VIDEOS p.23

Alan Tomkins casts his beady eye over Video Studio.

BACK TO BASE p.26

A look at all the databases available for the Commodore mean machine.

A 32 BIT AMIGA p.28

Can you really make the Amiga better than it is? Kenn Garroch looks at the Animate Turbo Board.

WORD WISE p.31

Our man rounds up the word processing packages available.

FEELING A BIT IFFY? p.32

The headline writer thinks he's so smart! Mike Nelson explains what IFF files are all about.

COMPETITION p.33

Win an Amiga courtesy of your ever generous *Popular Computing Weekly*. PLUS... The result of our super video competition.

PROFESSIONAL PAGE DTP p.35

Alastair McCann enthuses over ProPage. Watch out, he will be writing poetry next!

BYTES AND PIECES p.37

A machine code that makes your CPC more interesting. It has to be seen to be believed.

SIMULATIONS p.39

Lee Paddons thoughts turn to cricket and air traffic control. Well, he always was a bit weird.

TECHNICAL PROBLEMS p.52

Kenn Garroch brings relief to all those troubled households. What a guy!

LETTERS p.54

Problems with a printer, more on software protection and the Atari 130XE.

CARTOON p.54

New Acorn still outprices Atari ST and CBM Amiga 500

By Billy MacInnes

ACORN HAS unleashed its cheapest Archimedes micro since the A305, the A3000, but its price of £649 plus VAT is still more expensive than the dominant 16-bit home computers, the Atari ST and Commodore Amiga.

Acorn's managing director, Harvey Coleman, told *Popular Computing Weekly*: "The A3000 has extremely good multitasking abilities and is very affordable. There are two main markets: education and the top end of the home computer market. This micro is the Rolls-Royce of the home computer market. It is aimed at the serious hobbyist and the businessman working from home."

On the subject of future reductions in the price of the A3000, Coleman told us: "The price of the A3000 could be affected either way by the DRAM situation. Personally, I think that the availability of DRAMs will improve within a year." If Coleman is right, the micro could come down in price when the situation improves.

The A3000 contains the 32-bit reduced instruction set computer chip set with 1MB of fast access RAM - internally expandable to 2MB - has a small footprint and a 3.5in. floppy disc drive. Peripherals from Acorn and



The moment it all began for the Archie: Brian Long unveils the A305 two years ago.

others can be added internally and externally for further expansion.

The WIMP system is immediately accessible from the 0.5MB of ROM, rather than loading from disc, which makes it faster to access.

Software for the machine is fully compatible with Archimedes 300 and 400 models. Software emulators exist to allow access to BBC Model B, Master 128 and MS DOS packages.

We asked Coleman what level of support could be expected from software developers. "The A3000 is completely compatible with all software

that runs on the Archimedes series. We have had several previews of the machine and RISC OS with independent software producers and the response has been tremendous. There is nothing in the new machine which makes the software inherently more expensive."

The A3000 has built-in stereo sound and can accommodate an internal combined MIDI and User Port card. A second internal expansion slot is provided for an Econet card for use in low-cost networking applications.

The machine gives up to 640 x 512 resolution and has a palette of 256 on-screen colours from a choice of 4096 colours in over 25 different screen modes.

The A3000 will be on sale to the public for the first time at the BBC Acorn User Show from July 21 to 23.

On the subject of the A305, a spokesman for Acorn's technical support division, told us: "The 305 has 0.5MB of memory, as opposed to the A3000's 1MB. Whereas the A3000 can be upgraded to 2MB, the 305 has an upgrade capacity of only 1MB. Most of our 305s have been upgraded to 310 models to accommodate RISC OS. To all intents and purposes we no longer do the 305." For the record, the recommended retail price of the 310 model is £899 plus VAT.

IN BRIEF

Bombers investigated

A BULLETIN BOARD in Gaithersburg, Maryland, which carried details of home-made bomb formulae is under investigation in connection with the deaths of four teenagers last December. A 17-year-old who operated a BBS which supplied the bomb formulae has been arrested in connection with a pipe-bomb explosion in Germantown, Maryland, on March 26.

According to *Newshytes*, investigators found at his home, 30 computer discs with instructions and formulae for making home-made bombs and addresses of mail order companies offering the necessary supplies. The four deceased are thought to have received details of bomb formulae from the BBS.

Dr. Doom's Revenge

A PC adventure game which features Spiderman and Captain America is being shipped by Microprose in the U.S. *Dr. Doom's Revenge* is a graphic adventure which allows the player to "enter" comic panels.

Tass gets lap-tops

REPORTERS for Tass, the Soviet news agency, are using lap-tops supplied by a U.S. computer company. Holographic Systems has won a £1.2 million contract to supply the Soviet Union with lap-top computers. The firm is also planning to supply PCs, lap-tops, software and peripherals to Radioelektronika No.1, Moscow's largest computer store and showroom.

His Holiness speaking

DO YOU fancy a little spiritual relief? It is now possible to receive a two-minute message from the Pope via the telephone. The recorded messages are changed daily and the lines are open 24 hours a day. If you would like to contact His Holiness, the number is 010 39 77 793020.

Harry Boys' overdraft hits city screens

COMPUTERS have become so advanced that even writing a letter to your bank manager can be fraught with danger. Nigel Spall, a city journalist, was the victim of a highly embarrassing incident when he pressed the wrong button on his computer.

Spall works for the financial news agency, EXTEL, and was using the firm's computers to write a letter to his bank apologising for his overdraft. Instead of printing the letter to his bank manager, however, the computer flashed it all over screens in the money markets in Tokyo, New York and Paris.

Spall has decided to stick to a typewriter in future.

Israeli schoolchildren play racist game

ASSOCIATED PRESS has reported the emergence of an anti-Palestinian computer game, which is circulating among Israeli children. The game is called *Intefadeh*, which is the Arabic word used to describe the revolt against the Israeli occupation of the West Bank and Gaza Strip.

A spokeswoman for the Israeli Embassy in the U.K. told *Popular Computing Weekly*: "We have received several complaints about the game and we are investigating the matter to find out whether the story is true or not." Associated Press quotes a local computer buff, Shahar Mefamed, who has seen the game. He said: "Some details of the program indicate it was done in the United States. I don't know who wrote the program but he seems to be a very good programmer."

Players take on the role of an Israeli

soldier and get points for inflicting casualties on demonstrators, but they are only allowed to use certain weapons depending on who is defence minister. The defence minister is chosen at random by the computer.

Points are scored by inflicting as many casualties as possible within a time limit using "proper" ammunition. Players gain points for electing right-wing politicians, because these are more likely to allow the use of more brutal weapons in putting down the uprising.

At the end of the game, the screen displays how many protesters have been injured, killed or captured. If the player is killed, a message reads "just another victim of Arab terrorism."

If the story is true, it is ironic that the targets of racist games circulating in West Germany should be playing a racist game themselves.

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THE COMPUTER Threat Research Association has responded to the allegations made by Joe Hirst in *Popular Computing Weekly* last week. The steering committee has issued a statement which vigorously rebuffs the charges made against the organisation. It reads as follows:

"The following statement is from the current steering committee and addresses the issues that concern CoTRA in general.

- The Computer Threat Research Association is an open and non-profit making organisation. The issues that Mr Hirst has raised are without foundation or substance and do not reflect the views of any other participant of CoTRA.
- Mr Hirst's accusations on the issue of democratic conduct are simply not true - the current steering committee exists to establish the basic

CoTRA hits back

organisation of CoTRA and all members will step down for the association to elect a committee in July at the first general meeting.

- There was never any intention or desire to exclude Mr Hirst from the committee. He was, in fact, invited to join but disagreed with the use of electronic conferencing as a method of conducting business. The rest of the committee preferred to meet this way and Mr Hirst therefore excluded himself.
- Mr Hirst was one of the earliest supporters of the concept of the Computer Threat Research Association and the steering committee recognise the value of his efforts and find it unfortunate that he feels he cannot continue to sup-

port the association. Signed:

The Computer Threat Research Association Steering Committee, P. Crewe, C. Frost, V. Gallow, M. Gibbs, A. Holt, K. Osborne, V. Pinkava, A. Solomon."

In addition, Mark Gibbs has responded to the allegation made against him by Hirst concerning the supply of viruses to a reviewer for *PC Tech User*.

"The report of the indiscriminate supply of computer viruses to unknown persons is extremely inaccurate. There has only been one occasion when I personally released virus materials. The programmer concerned, Kevin Powis of Media Magnetics, had been commissioned to write a review of anti-virus software by *Tech PC User*

magazine. He came highly recommended by the editor, Dave Allen, with whom I have worked on a number of occasions. Mr Powis was made fully aware of his responsibilities and Mr Allen was copied with the correspondence to ensure that he was kept informed. Mr Powis has destroyed all the virus material as requested and CoTRA has now established a vetting committee to determine who should be allowed to access computer virus material held by the association."

He concludes by taking us to task for not explaining that CoTRA is concerned with all threats to computer systems and not just viruses.

"CoTRA is not a 'virus buster outfit' as your headline misleadingly suggests. The Computer Threat Research Association was formed to address the broad spectrum of threats to computer systems of which viruses are a very small, if fashionable, part."

Protection on my radio

THE Data Protection Registrar has taken to the air with two 30-second public service radio announcements aimed at helping to explain the rights of the public under the Data Protection Act.

Both dramatise a situation where



Eric Howe, Data Protection Registrar: "radio tapes are to widen public awareness."

the right to see computer records and have them corrected would help solve a problem. In one case, a character is passed over for promotion and there is good reason to suppose that the personnel records are inaccurate. In the other, house insurance is refused because of an alleged history of previous claims.

Alexandra Pigg, who starred in the film *Letter to Brezhnev*, features in one of the announcements. Eric Howe, the Data Protection Registrar, says of the campaign: "These radio tapes aim to widen public awareness of some of the valuable rights the Act provides for us all. Although the volume of complaints I receive now exceeds 1,000 a year, we realise that this is just the tip of the iceberg."

The Data Protection Registrar has produced eight guideline booklets explaining how the Act works. If you would like to know more, telephone: 0625 535711.

New Amiga hard discs on sale

A NEW Amiga hard disc drive which is claimed to be at least £200 cheaper than any equivalent is now available from Micron Computers.

The hard disc is a Great Valley product and contains a Quantum Prodrive which has an access time of 11 milliseconds, auto-booting with 1.3 Kickstart and a Fastfile system through all of the partitions.

According to David Barber at Micron, the drive "is the best drive on the market. No other drives use a full fastfile system. Our drive is at least £200 cheaper than the nearest equivalent."

The A500 version is a 40MB drive with a free 2MB RAM expansion board, a BAD disc optimiser and retails for £635 inclusive. The A2000 hard drive is an 80MB drive which retails for £805 inclusive.

For more details contact Micron on 0787 881998.



More memory power for the A500 and A2000.

Takeaway simulator

WHEN YOU telephone an order for a takeaway from your local pizza house in the future, you could be talking to a micro.

Pantel International demonstrated an interactive telephone to PC voice communications system at the PC User Show. The Zenergy ToneTalker provides interactive communication, using a touch-tone telephone, with popular MS-DOS programs running on IBM PC-compatibles.

Pantel had a restaurant ordering system running in the show, whereby users could order food by telephone. The computer registers the order and calls back to make sure that the caller is bona fide.



It doesn't look anything like a pizza, does it?

The system can be used for voice mail, BBS and information services, stock enquiries, home banking and remote order entry. The Tone Talker Voice Mail system costs £995. For more details telephone 0753 21610.

Boxing clever with Punchstat

WHEN MIKE TYSON hits someone that person usually knows he has been hit. In case he missed it - perhaps because he was sprawled on the floor of the ring - a Compaq computer can help him relive the moment.

Disenchanted with the lack of computerised statistics and data which are standard with other sports, such as baseball or American football, two New Jersey boxing fans have created *PunchStat*.

PunchStat is a software program which counts and categorises the type

of punches thrown and landed during a contest. Three seconds after the end of a round the computer can print-out an evaluation which tells a trainer how his boxer has fared. A comparison of the punches in the round and the pre-fight strategy can give the trainer important information about altering his boxer's fight strategy.

Clients using *PunchStat* include several television stations and fighters. The package helps television networks with their televised analysis and unofficial scoring of fights.

The Fax from Philips

PHILIPS Personal Office Systems has launched a new range of computers which incorporate a Communicate SR fax card as standard.

The PC-FAX can communicate with any Group 3 fax machine, the standard in the UK. When the computer is being used for a different task, such as word processing, notification of an incoming fax is provided.

The PC-FAX 1 system is based on the NMS 9110 Philips XT computer with twin floppy discs. The PC-FAX 2 includes a 20MB hard disc, which



The Philips NMS 9110 XT computer, now it comes complete with a Communicate SR fax card.

allows messages to include company logos and graphics. It has a special Philips interface which provides the ability to use the system without loading software each time the machine is switched on. Both systems can be supplied with a printer for an additional £150.

The computers, which were displayed at the Which Computer Show, are being shipped this week. The PC-FAX 1 costs £849 and the PC-FAX 2 £1,049. For more details, telephone: 01-686 2199.

ATC Radar crashes

FRANTIC STAFF worked desperately to repair the Melbourne Airport fault-prone radar system while aircraft circled overhead. The computer-controlled Air Traffic Control Autonomous Radar Display System crashed when the power was switched from the main supply to a secondary generator to let technicians service the main equipment, according to *Newshub*.

It took 20 minutes to get the system running again, during which time controllers had to space aircraft and delay incoming and outgoing aircraft.

The ATCARDS system has had some 33 software modifications but it is still not bug-free after 10 months' work. In one incident last June the French-made system failed to recognise a Qantas Boeing 747.

The problem mainly affects short-range radar. Controllers have resorted to mixing data from ATCARDS with that of an older long-range system and spacing aircraft. This meant the airport was handling fewer aircraft than it could because the new system was not working properly.

Hi-tech hotel

A NEW HOTEL in San Francisco promises to have everything the

modern businessman needs. The Nob Hill Lambourne will have rooms equipped with IBM PS/2 computers, Rock fax machines, voice mail, a Macintosh desk-top publishing room and audio-visual facilities.

The Nob Hill Lambourne will open on July 1 and rooms will cost from £100 to £150 per night. Other "executives" are planned in London, Paris, Seattle, Chicago, New York and Boston.

CBM goes back to school

COMMODORE has launched The Primary Project to assess the potential of the Amiga as a teaching tool in primary schools.

Amiga 500s with 1MB of memory have been supplied to children, along with *Deluxe Paint II* and *Kind Words*. They are used to combine text and graphics for simple DTP to support the children's project work.

Richard Adams, a teacher at Holway Community Junior School says: "All the children have been extremely enthusiastic. Children with severe learning difficulties are suddenly on an exciting par with their peers. So far the



Commodore gets them young: Children at Tivishall County Primary School work on an Amiga.



Dust Bunny is at hand for tired terminals, courtesy of the Dust Bunny.

Computer massager

A NEW PRODUCT has arrived at the *Popular Computing Weekly* office. Known as The Dust Bunny, it appears to be used to provide a relaxing and cleansing massage for tired computer terminals after a hard day's work.

Dust Bunny is "electrostatically charged to attract and remove dust". The makers claim it does not use aerosols or chemical sprays, which makes it an environment-friendly product. It can be washed and tumble-dried without deterioration.

It is available for £2.99 from P.I.G. (U.K.). For more details, telephone 01-871 3088.

Amiga 500 has brought out qualities in some children I did not know existed."

The headmaster of Tivishall County Primary School in Norfolk, Ian Hollingsworth, is particularly pleased because the Commodore BBC Emulator allows the school to run its BBC software on the Amiga. "We have roughly 250 BBC programs in the school and that represents a sizeable investment which we do not want to lose," he says.

The pilot project, which has been running in five regions since January, has been extended to another six local education authorities. The Primary Project will run for nine months. It is hoped that it will lead to the development of Amiga software to support the national curriculum.

POPULAR COMMENT

We just asked Ken Garroch what he thought of the new Acorn Archimedes A3000, which he is currently reviewing for next week's issue: "It's great. I want one. It makes the ST and Amiga look totally silly," he said. Catch Ken's thorough review next week.

Assuming that hardware-wise the machine, with its built in reduced instruction set operating system, is as good as Ken's initial reaction testifies, what of the price? If Acorn has got the hardware right, will it tip at the fence of software availability or price sensitivity? At £746, the A3000 represents a huge investment for any popular computer user currently pondering an upgrade. Add a couple of hundred pounds for a monitor and we're talking serious money. When comparing prices in terms of memory, a 1MBYTE ST (1040) costs £499 and an Amiga 500 expanded to 1MBYTE costs around £550 (£399 plus £149 upgrade); still far short of Acorn's £746 figure for the new A3000. Will that price difference persuade users to plump for the new BBC micro? A circa £499 price would give the company a better start. The "Rolls Royce" of computing expounded by Acorn boss Harvey Coleman is all very well, but those vehicles only sell to a select few at a price that is prohibitive to the majority.

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Basically SAM

Our Spectrum correspondent John Wase got stuck in a FOR...NEXT loop near Spaghetti Junction, and ended up getting a sneak preview of the Basic to be implemented in the new MGT SAM micro.

A prototype of SAM, the new MGT micro, has been on show again, this time to the trade at the European Computer Trade Show. Dr. Andrew Wright had clearly taken time off from writing the ROM to produce some new routines for the Show. The speed of the display was impressive, to say the least, particularly as we were told it is programmed in Basic. I was able to run to earth some of the Basic routines used at this and at the previous Northern Amateur Radio Show at Blackpool for some simple demonstrations with SAM.

The SAM Basic language is based loosely on Wright's Beta Basic, a program which has had several progressively more complex versions and which he wrote for the Sinclair Spectrum almost as soon as it appeared. At that time Wright recognised that there were many improvements which could be made to the Sinclair rather basic Basic and incorporated them in his programs. The pieces of SAM Basic I was able to obtain reflected that pedigree to some extent but

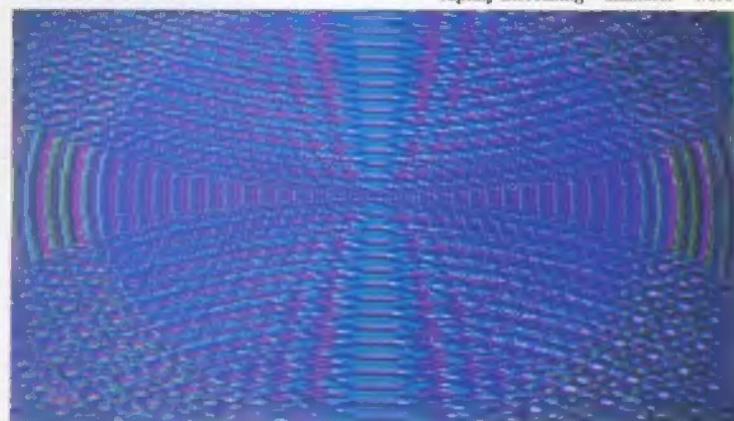


Fig 1. The circles ripple out.

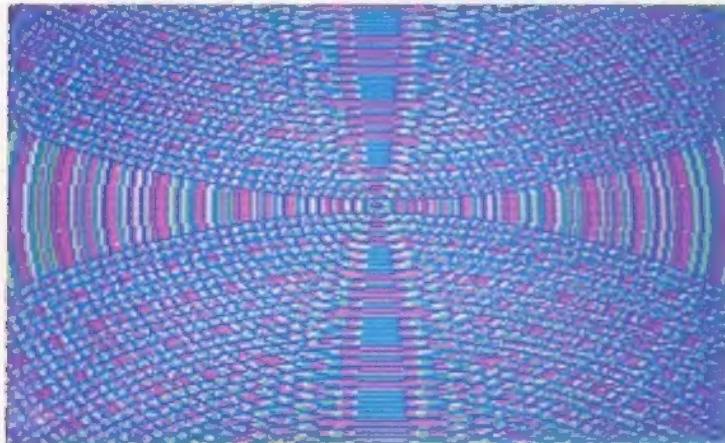


Fig. 2 Back come the arcs.

there also seemed to be a number of new commands.

The first two pictures - figures one and two - scarcely do justice to the rapidly-moving screens. Starting from the centre of the monitor, circles of rapidly-increasing diameter were

```
100 FOR t=1 TO 1000
110 PALETTE RND(15),RND(63)
120 INK RND(15)
130 OVER RND(1)
140 FOR n=1 TO 255 STEP RND(3)+1
150 CIRCLE 128,79,n
160 NEXT n
170 NEXT t
```

Fig 3. The subroutine for circles and arcs. Note the indented listing.

drawn, one after the other, in a range of contrasting hues and with no attribute clashes; as soon as the circle filled the screen arcs continued to radiate in from the edge until they met again in the middle. The whole process took between one and two seconds, varying with the size of the loop, and successive screens of differing basic colours were presented in a kaleidoscopic display.

The subroutine running this is shown in figure three. It looks at first sight like a ▶



Fig 4. Filling the circles.

simple FOR NEXT loop, which it is; after all, that is by far the simplest way to write such a routine. The way it is set out, though, is reminiscent of Beta Basic rather than Sinclair, with indented lines to clarify the listing.

The commands mostly are different again. PALETTE, for instance, is a new command, indicative of the wide choice of SAM screen colours. Note that RND can now return an integer between zero and the number in brackets following it. Even INK has a much larger choice than previously.

At first sight, CIRCLE seems much the same as the original ZX-81 job, but I understand that Wright claims this is now some 70 times faster than the original 48K Spectrum command, itself faster than some of the later issues, and certainly this seemed reasonably in line with our timings.



Fig 5. Lots of colours, no attribute dashes.

```

200 BLITZ p$*
210 FOR p=1 TO 100
220   FILL INK RND(15),RND(160)+48,RND(160)
230 NEXT p

```

Fig 6. The listing for Fig 5, SAM's Basic, sure is economical...

This was followed by a display of three circles, with the foreground and background filled with an assortment of colours - figure four. I did not obtain the listing for this but from the previous one it would appear to be almost trivial. The speed was the impressive thing, as before.

After that came an attractive circular object, with plenty of arcs drawn through the centre. Figure five gives a general view. Again, the drawing was almost instantaneous. The subsequent filling of the

```

10 DO
20 FOR n=2 TO 6 STEP 2
30   INK n
40   LET xos=(n-4)*20
50   BLITZ a$*
60   NEXT n
70   FILL INK RND#14+1,0,0
80   PAUSE 100
90 LOOP

```

Fig 7. More economical code to do Blackpool's stars.

various segments with a random assortment of colours, using the FILL command, was interesting. The Basic coding is very economical; four lines say it almost all - figure six. BLITZ in line 200 is an interesting new keyword for Sinclair devotees; a large number of PLOT and DRAW commands can be encompassed in the string p\$, defined elsewhere in the program, and BLITZ does it all at a gallop.

The other novel feature of this routine is in line 220. A FILL command is used - and just look at the parameters possible with INK.

Finally, I managed to obtain the routine - figure seven - which drew all those stars so quickly and changed the background colours so effectively at Blackpool. That one was not on display in London. Beta Basic users will recognise the DO loop, though to

others who have not been brought up on Fortran it will look decidedly unusual. In this case, too, we have economical coding with the use of BLITZ, together with Wright's rapid FILL routine. At least PAUSE 100 looks familiar to the Sinclair clan.

Here, then, while we have a machine which some have claimed has almost a Sinclair pedigree, the reality, from what I have been able to discover, will be vastly different. Structured programming with excellently-implemented procedures, extended keywords - like the "long" IF - many new commands and, above all, a vast improvement in screen capabilities and speed all combine to make this a totally new computer.

I hope it will not be too long before review units are available. Until then I must bite my nails in frustration.

HOTLINES

Did you see Arnie in *Red Heat* at the cinema in January? If you did not and were thinking about renting it on video, do not bother – it is boring. I hope the game is better, check the pic of the Spectrum version.

I have been bombarded with press releases and now a product from a software house called White Panther. *Alpha Max One* is one of its first releases; it is a vertically-scrolling shooter on the ST. Unfortunately it is not particularly good which is unfortunate for the program-



Red Heat – Spectrum

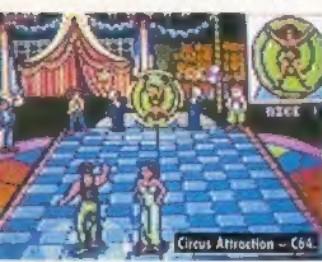
mer, Jon Wheatman, as well, because his picture and background adorn the inlay. Guess what his burning ambition is to do on his 17th birthday? Buy a Porche. Well, he will have to provide something better if he wants to buy anything bigger than a Matchbox Mini.

Rainbow Arts, the West German company which veers wildly from the brilliant to the dismal seemingly with every release, has sent me a copy of *Circus Attractions*. It looks satisfactory, full review next week – as you can see by the C64 screenshot. After the poor

Grand Monster Slam I hope this is a return-to-form.

As the Division One championship reaches its climax, the computer soccer market is getting equally exciting as well. For Spectrum owners, *Microprose Soccer* is the only choice and for the CPC and C64 it must be *Emlyn Hughes International Soccer*, with the Anco Kick Off ruling the ST roost. So what about the Amiga? Both Anco and Microprose are about to release their fairly similar games, so expect a comparative review of those two soon.

Duncan Evans



Circus Attraction – C64

Answer: Apart from the numbers mentioned in the puzzle the only other numbers are 175, 518, 598, 1,308, and 2,427. We are excluding the trivial case of single-digit numbers. Although it has not been proved that no other numbers with this property exist, it seems highly unlikely. Exhaustive computer tests have taken the search up to numbers with many more digits than this without finding further examples.

Solution: In the listing, the two-dimensional array is used to hold the complete set of powers, from first to seventh, of all nine digits. This enables the program to add the required sum without the need for a good deal of repetitive calculation. Each starting number is taken in turn, converted to a string variable and the appropriate power added to the running total (T). If, at the end of the operation, the total so obtained equals the starting number, the result is printed out.

When generating the values of the various powers to go into the array at the start of the program, a process of direct multiplication is used rather than using the 'power' command on the computer. This is because some computers tend to introduce certain 'rounding' inaccuracies when using this function which might adversely affect the results obtained.

SOLUTION TO PUZZLE OF MAY 11

```

10 DIM P(9,7)
20 FOR N=0 TO 9:P(N,1)=N:NEXT N
30 FOR N=0 TO 9:FOR P=2 TO 7
40 P(N,P)=P(N,P-1)*P(N,1)
50 NEXT:NEXT
100 N$=1
110 N$=STR$(N):T=0
120 FOR F=1 TO LEN(N$)
130 V=VAL(MID$(N$,F,1))
140 T=T+P(V,F):NEXT
150 IF T=N THEN PRINT N
160 N=N+1:GOTO 110

```

PUZZLE

The expression shown below consists of the digits from 9 to 1 in reverse order together with a selection of the four mathematical signs +, -, × and ÷.

$$9 - 8 \times 7 - 6 \times 5 + 4 \div 3 - 2 = 1$$

As you can see, a selection of seven of these signs has been inserted – one sign between each pair of digits – to make the expres-

sion correct. When evaluating the expression the calculations should be taken in order, from left to right.

How many different expressions can you make subject to the rule that each of the four signs must be used at least once in each case?

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	Ocean	
6	In Crowd	9
	Ocean	
7	Football Manager 2	12
	Addictive	
8	Emlyn Hughes International Soccer	5
	Audiogenic	
9	War in Middle Earth	7
	Virgin Mastertronic	
10	Renegade III	6
	Ocean	
11	Padland	20
	Grandslam	
12	Microprose Soccer	RE
	Microprose	
13	Afterburner	15
	Activision	
14	WEC Le Mans	13
	Ocean	
15	Arcade Muscle	5
	U.S. Gold	
16	Barbarian 2	RE
	Palace	
17	R-Type	19
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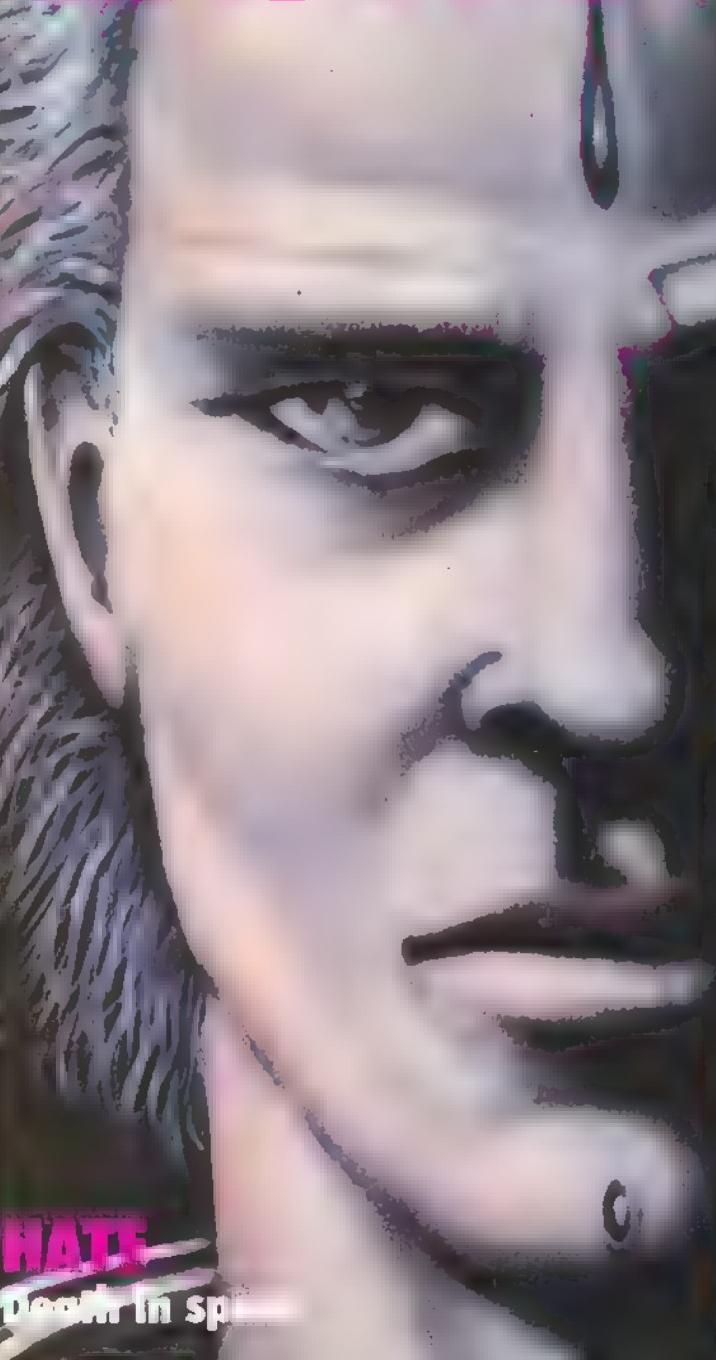
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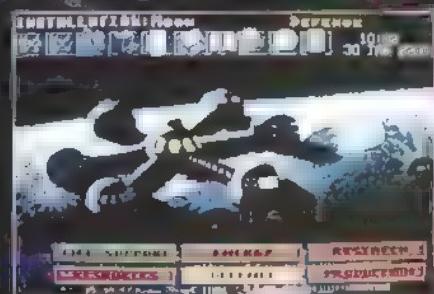
Computer GAMESWEEK

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HATE

Death in space



MILLENIUM
Lost in space 22



VOYAGER
The spaceman cometh



FAX BOX

Program: Millenium 2.2

Version: ST

Price: £19.95

Supplier: Activision

Reviewer: Duncan Evans

RELEASE DATES

ST: June

Amiga: June

The giant asteroid is approaching the Earth, people are panicking, riots are breaking out everywhere, law and order is disintegrating in the face of imminent disaster, there's no hope left, save to pray to whatever gods you believe in. Can mankind be saved? Can catastrophe be avoided?

Well, no. The asteroid hit the Earth in the Pacific, went through to crack the surface and expose the core. Millions of tons of water was thrown into the atmosphere, and as the ocean raced back into the gaping wound, it hit the heaving magma and exploded skywards once more as superheated steam. Tidal waves, hurricanes, and earthquakes devastated the land. Death itself was abroad, and none were saved.

Good job you were the commander of the base on the moon when it happened then. Alas there isn't very much left of civilisation, just your hardy lot on the moon, and another base on Mars.

Your task is nothing less than the salvation of the human race, through repopulation of the solar system. It'll be some time before you get to sending settlers to other planets though, since all you have in the way of equipment on the moon is a Solagen Mk 1 energy generator.

Your moonbase is divided into resource, production, life support, research, defence, flight bay and en-

ergy divisions. Before you do anything, install the Mk 1 generator which will provide you with the minimum of power. Before you can build any more generators, or equipment, or spacecraft you need to research the project. This also applies to colonising moons and planets once you've landed a probe on them.

Once the research boys have produced the plans and energy costs for the equipment, you can rush on over to production and get building. You must have both the energy and the raw materials to do so though, and not all of the raw materials needed for the big projects are available on the moon.

Don't expect to build anything large to start with, not until you've got your energy plant built up.



the display cut to a 3-D Elite style space war I was gob smacked. You can only move your fighters display left-right, and up-down, there's no chasing things around, but it's very well done for a strategy game all the same.

There are more treats in store in Millenium 2.2 but it will take you some playing to get to them. When you finally have a probe in orbit around Saturn, you'll feel it was worth the trip. Don't expect things to happen in a rush, for all its gloss and classy graphics this is a strategy game at heart, the rest is a bonus.

I can only really fault the sound effects which leave something to be desired, because the rest of the game is an engaging and entertaining, quality space management production, and can be recommended to commanders everywhere.

Once into the game you'll probably like to launch a probe - this has unforeseen effects so make sure you've also built a defence fighter by that time. Yep, the folks on Mars don't take too kindly to lowly Moonies interfering in the solar system. When they attack, launch a fighter and get ready for a surprise. Millenium 2.2 is a strategy/management game you see, so when

Gameplay	91%
Graphics	88%
Sound	54%
Overall	

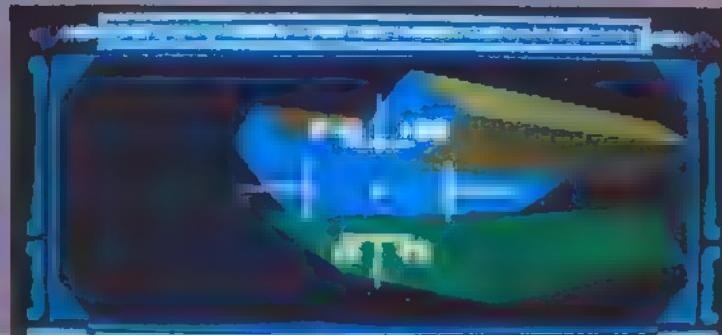
89%

FAX BOX

Program: Voyager
 Version: ST
 Price: £19.95
 Supplier: Ocean
 Reviewer: Kerry Culbert

RELEASE DATES

ST: Out now
 Amiga: Out now



• Prepare to be vaporized alien!

• Someone is watching you – better shoot them then.

Luke Snayles strikes back at the Ronix system in Superman style, saving Earth without a change of underwear in his weapon-wielding shuttle.

As Earth is now a weapon free zone, old Snayles ends his 50 year spell of shuttle confinement with a splash, his mission to obliterate the weapon manufacturing plant on Janus and the remaining ten moons in the Ronix system. And all this for killing a ferret!

Voyager may sound like a nail-biting experience, but you'll have a long way to go before you reach the stumps I'm afraid as there is very little new, interesting or exciting about this game.

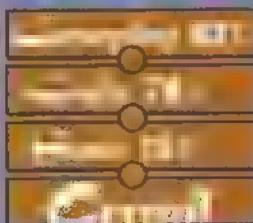
Starglider 2 by Rainbird was surely the inspiration for this game, sharing a similar method of control, as in both games you accelerate with the RH mouse button pressed and fire the laser with the LH button. Again the two games are alike as they both display a 3-D effect, although **Voyager** plays second fiddle to **Starglider** on all these counts.

Each of the ten planets in **Voyager** have 80 hostile craft defending it, all of which must be destroyed to open the portal for transportation to the next planet. As you progress you can 'scoop' energy pods, and on later moons certain pods allow you to



STRAIGHT! 100% TO 100%
 CRAFT: DROP SHIP STORM CLASS:

• Dive, dive, dive – straight into the planet!



change your craft from a tank type to an aircraft which is just as well.

It's the limited firing range of the tank mode which is the most frustrating facet of **Voyager**. There isn't much scope for elevation which is a stroke of bad luck as clusters of enemy craft lurk overhead. There's almost time to cut your toe-nails until you do manage to detect them on your radar at the bottom of the screen, but when you do they predictably remain hidden in a group and are easily destroyed by alternating between acceleration and deceleration.

The radar area is important as it gives a floating picture of equipment pods etc. via colour coded dots. To gain fuller insight of your battle position however, you have to press the number keys (2-8) which display data on moons, weaponry information and the locations of remaining equipment pods. This is actually the most interesting part of the game, as the data boards swirl round in a circle as does your name when you enter it in the credit list.

The sound effects during game play are virtually non-existent except for the PING sounds as you hit the equipment pods. This is supposedly made up for by the sampled music at the beginning of the game which can always be missed by pressing the spacebar, and there is an equally boring cassette soundtrack provided which is an alternative to counting sheep I suppose.

Voyager has a few good points in its favour, but can't be as exciting as Nora Battie's legs. Snarly Snayles should have done us all a favour and opted for the suicide option mentioned in the booklet scenario. That way Earth may have been in danger but at least we wouldn't have died of boredom. Come back Superman, all is forgiven!

Program: HATE
Version: Amstrad CPC
Price £9.99
Reviewer: Marc Jones

RELEASE DATES:

CPC: Out now
Spectrum: Out now
C64: Soon
ST: June

It is a little daunting to witness yet another galactic shooting game which echoes the format of the mid 1980s space experiences. Entitled HATE the game begins in the year AD 2320 when the galaxy is in turmoil, as are most galaxies at about that time. With the alien threat ever-increasing it is your responsibility to repel the hostile forces and win the day for your respective planet.

The name of this game is sufficient to make you question your morals about death and destruction although, at closer examination, the word HATE is an acronym for Hostile All-Terrain Encounter which makes everything more acceptable. Your first confrontation is at the qualifying location of Stripworld where, as the name suggests, the scene is made up of a series of strips with undulating terrain. As a trainee you alternate between Star Fighter pilot and ground assault as you progress gradually through the ini-



• Scrutinising to nowhere, on the CPC.

creasingly difficult stages.

At first the game seems a little slow but after passing the initial levels you can be thankful of the designated speed. As you progress through your training it is your job to collect plasma cells which, in turn, provide you with extra lives for the subsequent level. There are 30 levels divided into three stages - training, fighter pilot and commander.

The first stage seems to go on forever, especially if you cannot come to

terms with survival by force which makes it all a little frustrating. This is the name of the game, however, as it encapsulates the hate and frustration of learning a new skill but it also tends to be destructive, in that boredom can easily creep in.

Through patience, persistence and a little luck it is possible to reach the other two stages where, as a graduate Galactic fighter pilot, you have to defend the civilised sectors of the planet. This calls for increased concentration and patience to reach the ultimate goal in saving your star-struck community.

Perhaps the game is a little too difficult at stages and, as a result, over-stretches itself to the extent where Stripland, hating and shooting strange objects, becomes a little tedious. The price, however, is a positive aspect as it provides a fairly large game for a reasonable cost which makes it readily available to the younger consumer, although the marketing direction of the game is somewhat questionable.



• Scrolling down the only road I've ever known, on the ST.

Gameplay 67%

Grafix 68%

Sonix 50%

Overall

66%

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Logos for videos

Have you noticed how all good art and video packages require 1MB and two disc drives? That may be a minus point for many people. Those with credit cards should have no problem but for those who do not a period of saving is required.

Once having obtained the memory upgrade an extra disc drive makes life far more rewarding and one of those rewards is a new video titling package, *VideoStudio*, from ZVP.

As well as the Amiga you will need one video recorder and one TV/monitor but a second video recorder, TV/monitor, video camera and a Genlock will make life much easier.

Video Studio can be used with or without a Genlock, so for the sake of this review I will assume you have one. For those who do not place the A520 modulator into the monitor socket of the Amiga, then take a video lead from the video out of the modulator into the video in of the VCR, video out into TV/monitor.

Place the Genlock into the Amiga monitor socket, Genlock video in to source VCR;



Genlock video out to recording VCR; a monitor for each video is preferred; if a camera is used, connect it to the source VCR. Now the system is set up let us look at the software.

VideoStudio is on two discs, vs2 being the program disc. The main program, called "Link", is sub-divided into departments, each one being a sub-program.

VideoStudio is menu-driven, most functions being available from the numeric keypad, so let us look at each sub-program in turn. The Test Signal includes 'Crosshatch', 'Colourbars', 'Definition bars', 'Testcard' - similar to EBU type - 'Flashing H-bar', 'Circle and Diagonals', 'Dots' and 'Grayscale'.

The test signal is generated from within the program and cannot be changed but the standard testcard is an IFF file and can be changed with either *Deluxe Paint III* or *Photon Paint*. Just place the art package in

◀ d0: and vs2: in dfl, boot the Amiga to ensure a clean memory.

The Fade/Indent clock is supported and includes an editable logo; the hands of the clock are generated from within the program. You can set the clock to real-time; you can then fade the clock in and out using the (+) and (-) keys.

Logo is an IFF file of interlace resolution, using eight colours. Keeping this resolution you can choose any eight of the 4,096 colours available to design your logo, which is faded in using the (+) and (-) keys.

Countdown is a screen display clock in minutes, seconds and tenths of a second and can be displayed on-screen like the countdown clock on Mastermind. You can also display a stopwatch/timer over your racing videos.

Wipes is effective only to the Genlock owner and set in the blue = transparent mode; depending on the wipe selected, pressing (+) and (-) alternately will change the screen from black to picture. You do not have to return to the menu to select the wipes of your choice; just select from numeric keys 1 to 9 for your selected wipe.

You can also alter the colours by selecting 'c' from the index; (n) steps the next colour to adjust; (R) (G) (B) keys will increase the red, green, blue values of the selected colour, while (r) (g) (b) reduces them.

Borders is really useful for those who want the wide screen cinema effect; you can even alter the height using the (+) and (-) keys.

PIPS is picture in picture and can load IFF files from art packages and digitisers. You can then load them in sequence; you can also set the position of the IFF inserted picture, shown by an orange box. View will display any IFF file, set the number of colours and resolution; you will then be able



Our reviewer's complete titling set-up with two video recorders and TV/monitor, video camera, Genlock and Amiga with monitor.

to put it into the PICs drawer for later use.

There are three distinct programs for titling: VideoStudio - 'Captor', a program for preparing and playing the main title sequences; 'Subtitle', a program for creating one or more sub-titles in a sequence; and 'Scroll', a program which creates scrolling titles, usually used at the end of films. You can also include small logos.

The Captor is the most flexible of the three and has three distinct operating modes: (1) displays a sequence of titles edited using its own text editor; (2) displays a sequence for superimposition on to existing video - blue screen mode; (3) displays a sequence of titles over an IFF file, which

you can edit yourself.

Captor does not use IFF files for storing screens. When Captor overlays text over an IFF file it does so only temporarily.

Amiga fonts are too small for the high-resolution modes VideoStudio uses, so 10 fonts are provided, seven of them resizable. Styles include Normal Text, Underline, Bold, Bold + underlined and the same again in italic.

VideoStudio works well with a Genlock and although you can use the package without one you will not get the full worth unless you buy one. Using the Genlock there are two distinct modes which decide which parts of the Amiga screen are 'transparent', or through which you see the external video.

One mode is where colour '0' and the border colour are always transparent; this allows all remaining colours to use any of the 4,096 colours of the Amiga and this is used in VideoStudio where the border may remain transparent.

VideoStudio can also be used for Insert Editing but make sure that the VCR you are to use has a good quality insert edit feature. If it does not, keep well away from it as you will damage any copies you make from your master tape.

VideoStudio is not a package you can use without the manual - that is good because it makes pirate copies unusable - but like most complex programs you must first learn how to use it with the manual in one hand. This manual is a little over the head of the newcomer to video titling but gives you all you will want to know to start making good VHS video titles. If you are looking for a good entry-level video titling package you need look no further than VideoStudio.

Thanks to Maze Technology of 20 Woodlands Road, Walthamstow, London E17 which submitted Video Studio for review and for the loan of the Rendale Genlock. □



The Fade/Indent clock has an editable logo, can be set to real time and is faded in and out using the (+) and (-) keys.

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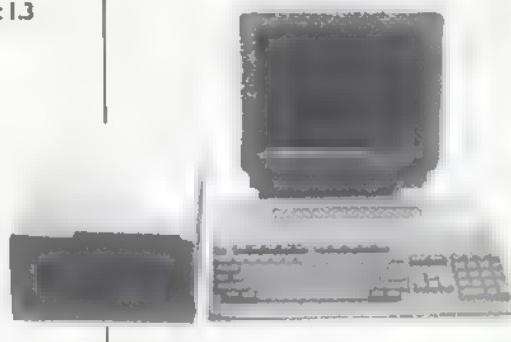
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Amiga database programs are in two forms - entry-level type programs which are satisfactory for straightforward applications and the expensive heavyweight variety designed to satisfy the more demanding user. In the first group the Amiga user has plenty of choice - Kuma K-Data, Precision Superbase Personal, Abacus DataRetrieve, Software Vision Microfile Filer, Micro System Organize and many others. All are easy to use and relatively inexpensive, ranging from around £50 to £100, so they are ideal for many types of routine applications.

So far as the heavyweight Amiga database programs are concerned, there are three main contenders, Acquisition, Superbase Professional 3 and Professional DataRetrieve. All three support multi-file applications, have comprehensive searching and reporting facilities and include a Basic-type programming language. All suffer from the same disadvantage; they are complex packages so they take time to understand.

Acquisition

Acquisition, from Taurus Impex Ltd, costs £249. It will, for most applications, run satisfactorily under the basic 512K of memory but it requires two disc drives. Field length is dynamic and up to 16 files are allowed to be open and accessible in a given single application. It is a package which appeals to those who like the relational database approach and since it was written specifically for the Amiga it is well integrated into the Intuition environment, e.g., when you include IFF-based fields for picture and sound storage the field prompt will include a clipboard icon strip which, in final applications, gives users icon-based access to their picture and sound data.

Superbase Professional 3

Superbase Professional 3, also £249, is the latest offering from Precision Software Ltd. Included among the latest enhancements are two areas of special interest, support for the AReXX interface and the inclusion of communications facilities. The Superbase Professional database management language is known as DML; it contains almost everything you would expect of a database management language and includes commands for programmed control of the newly-added AReXX interface and communications facilities.

AReXX is a macro language which allows commands and data to be passed between applications programs. Using the interface, an AReXX program, or another applications program which supports AReXX, can tell Superbase to carry-out any function which you could perform at the keyboard. Likewise Superbase can pass messages to other applications.

Back to base

Away from games and graphics the Amiga is a powerful business tool. Essential to any business is a database, and here Amiga pundit Paul Andreas Overaa explains what is on the shelves for the machine.

Another major enhancement is the inclusion of file transfer communications facilities. Superbase Professional 3 supports transmission and reception of data at 300, 1,200, 2,400 and 9,600 baud and you can use XModem, XModem-CRC or WXModem as the communications protocol.

Professional DataRetrieve

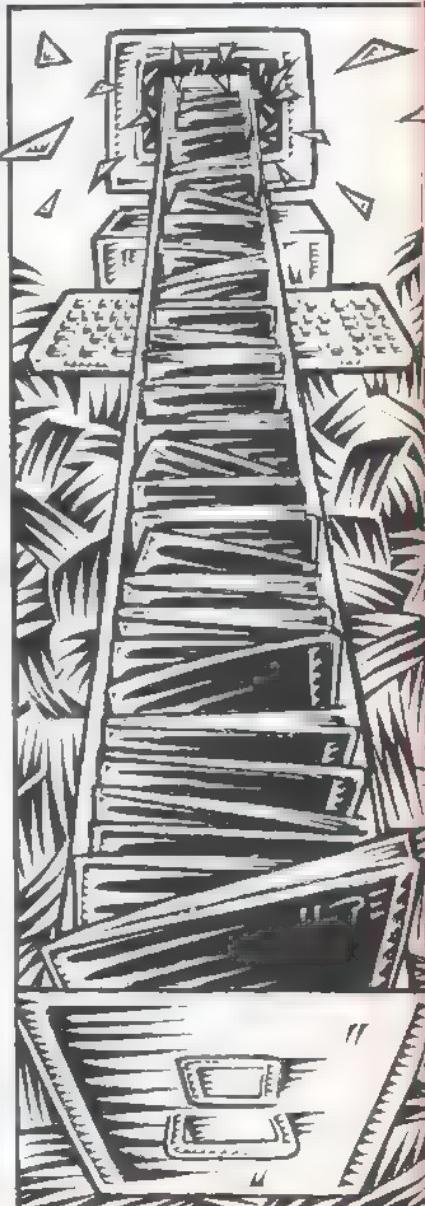
Professional DataRetrieve, the regional database offering from Ahacus/Data Becker, retails at around £170. It runs on all current Amiga models and can be used with a single disc drive but it needs a minimum of 1MB of memory. Password protection allows restricted use of the databases at both operator and user levels and you can prevent certain users changing records or using those facilities which allow record structure alteration.

Professional DataRetrieve is a powerful mask-orientated relational database which allows users to view their data in many ways. The programming language, called PROFIL, has more than 200 commands and functions; it is well-suited for writing cleanly-structured programs and easy to learn. It has many other facilities including the ability to exchange data via the Amiga clipboard device. Multiple indices and subranges can be created which speed the searching of large databases.

The basic search options support wild-card characters - unknowns - range specifiers, logical tests and global field and record searches but PROFIL programs can be used to carry-out any operations which might need particularly complex search criteria.

CONTACTS

Acquisition, Professional DataRetrieve and other database products: HB Marketing on 089 544 4433.
Superbase Professional 3 and other programs in the Superbase range: Precision Software on 01-330 7166.



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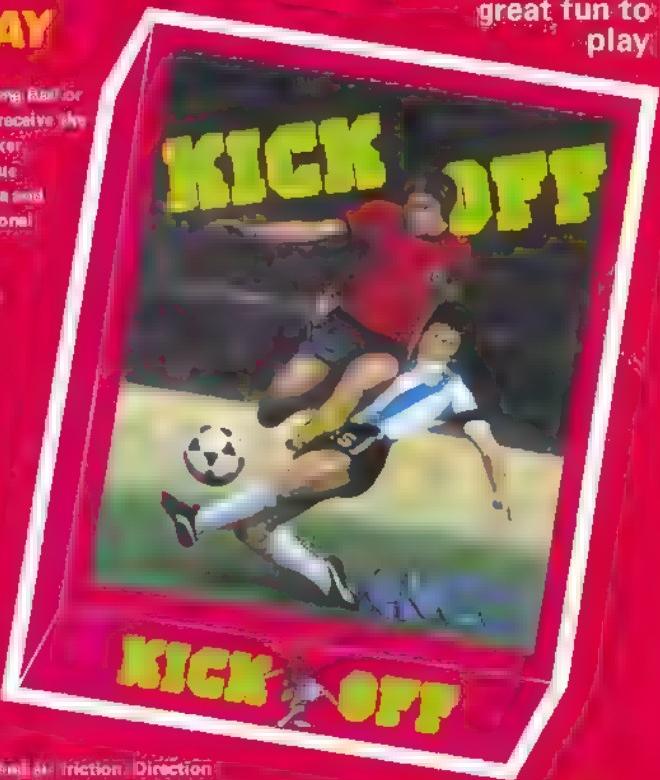
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At the heart of every personal computer is a microprocessor. It has control of all the machine hardware and runs the programs which form the software. There are many types of microprocessor and generally they fall into families - the manufacturer started with one model which was then upgraded to a later version and then to an even later version.

Motorola is one of the largest chip manufacturers and, with the 68000 microprocessor family, captured a large proportion of the home computer market. Starting with the basic 68000 model, other members of the family include the 68008, the 68010, the 68016, the 68020 and the 68030. In general the higher the number the later it was produced and the more capable it is, apart from the 68008 which is an 8-bit bus version used in the Sinclair QL. The Commodore Amiga and Atari ST are the most famous users of the 68000 and its 16/32-bit architecture and high speed are what helped to make these machines so popular.

Early microprocessors were able to manipulate eight bits - i.e., add, subtract and so on 8-bit quantities; eight bits allows values from 0 to 255. To obtain more speed and power, chip manufacturers soon started making 16- and eventually 32-bit processors. Sixteen bits allows numbers from 0 to 65,535 to be manipulated and 32 bits allows a staggering 0-4,294,967,295 - 0 to 2^{32} . In addition, the addressable memory is increased to 16MB with a 24-bit address bus as used on the 68000 or 4,096MB - from four gigabytes with a 32-bit address and 32 gigabytes, for the 68020 with its function code registers.

More speed

Adding a 68020, normally referred to as an 'Oh Twenty' to a standard 68000 system such as the Amiga should give it a little more speed. Adding a co-processor to handle floating point calculations should give it much more speed, at least when calculating. The Animate Turbo Board add-on for the Amiga is a 68020 and 68881 combination designed to put a new heart in the machine. Fitting it is reasonably straightforward, if a little delicate. First, the existing 68000 chip must be removed from its socket. This is a 64-pin package and great care has to be taken not to bend the pins, crack the casing, or generally damage it.

Having extracted the 68000, inserting the new 68020/68881 package in its place was reasonably easy although it had to be pressed hard to get it into the socket. I should point out that I did the test on an Amiga 500 which has an RF shield over the keyboard - a Faraday cage which keeps in all the electrical interference. When the

A 32-bit Amiga

A 32-bit processor add-on for the Amiga

by David Margerison
in association with the Amiga Club Germany
Klaus Glemm tested the Turbo board
board from the Amiga Club Germany

new piggy-back board is in place, replacing this shield is not possible; the new bit sticks up too much. The case top will just about go on, so it is not too difficult.

There were no instructions with it and I was a little worried about which way round it went. A quick call to Amiga Centre Scotland, the distributor, sorted that out and raised a new question. Will it work with an Atari ST? Amiga Centre did not know so I thought I would try it. After all, the 68000 is the same in both machines, in pin out anyway. The only possible problem is the difference in the instruction set between the 68000 and 68020. In user mode, 68000 code will run on the 68020 - according to the manual - but there are two instructions which do not follow the compatibility rule. The most glaring error is that MOVE from SR is a user mode command on the 68000 but in the 68020 it can be executed only in supervisor mode. All this can do is give a privilege violation error so, heart in mouth, I opened my 1040ST - not an easy task.

To my disappointment the ST 68000, although in the same 64-pin package, was soldered to the circuit board. Since I had no intention of de-soldering so many pins and installing a socket I will probably never know whether it would have worked.

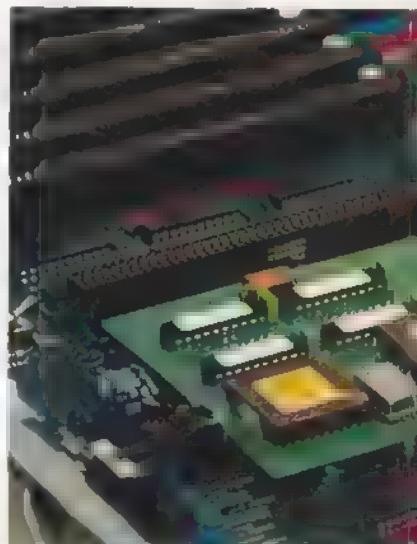
Back to the turbo board. What do the two chips do and why should they improve the performance of an already reasonably fast microprocessor? To answer the first question I contacted Motorola and requested the latest literature on the devices. There are two books; the first covers the 68020 in detail and the second the 68881/2.

There are a number of interesting additions to the 68020 compared to the old 68000. Looking at the internal registers tells most of the story if you know what you are looking for. The 68000 has the same eight data registers, i.e., D0-D7, and the address registers are basically the same - A0-A6 with A7, the stack pointer, being User or Supervisor, a special state which allows access to all the processor features.

From the User Mode point of view, the

machines are almost the same, apart from the glaring error mentioned. The obvious difference is that the program counter is a full 32 bits where the 68000 had 'only' 24 bits.

The main differences are when using the device in supervisor mode. First, there is the VBR which allows the start address of the vectors to be specified. In the 68000 this is set to memory location 0 and contains all the interrupt, trap and sundry exception addresses. The two 3-bit registers SFC and



The Animate Turbo Board replaces the A500 68000 with a 32-bit p

DPC allow alternate banks of memory to be accessed; this gives a possible memory size of 32 gigabytes.

The 68020 instruction cache system is an on-chip memory of 256 bytes arranged as 64 long words. With this enabled, the processor can fetch instructions from memory while it is busy processing other instructions. With a system like the Amiga where other devices such as graphics and audio

chips have access to the address and data buses, it allows the 68020 to continue executing instructions which have been cached even if it cannot access the memory. Although there are a number of limitations, correctly-written code will execute faster on the 68020 than the 68000, which sometimes has to wait for the buses to become free before continuing.

Other additions to the registers allow a Master Mode, similar to Supervisor, an additional stack register for interrupts, and another Trace Mode for program debugging. As well as direct additions in the hardware, there are a number of new addressing modes - methods by which instructions access the memory - and a selection of new instructions.

The Amiga is well-known for having a co-processor built into its hardware, the COPPER. It is somewhat different from the 68881 in the way it is programmed and accessed. The COPPER is separate from the 68000 and follows its own instructions in the common RAM. All the 68000 does is set it in motion. The 68881 maths co-processor, on the other hand, is directly programmable from the 68020 and can transfer data to and from the processor and memory using the same, or similar, addressing modes as



processor and coprocessor.

normal 68020 code.

As with any co-processor, it performs its specialised functions independently; if the main processor asks for the sine of a number, the 68881 will find it and return it with no further interference from the main processor. Instructions to the co-processor are executed by the main processor in the form of unused instruction codes.

When using the chips with the Amiga, the

Savage - 68000	- IEEE run on turbo board 2500 iterations - 2499.99999943541600 Time 5.54 seconds
Savage - 68000	- IEEE run on standard Amiga A500 2500 iterations - 2499.99999930824800 Time 51.10 seconds
Savage - 68000	- fast floating point run on turbo board 2500 iterations - 2762.85551643371500 Time 9.1 seconds
Savage - 68000	- fast floating point run on standard Amiga A500 2500 iterations - 2762.85551643371500 Time 11.92 seconds
Savage - 68020	- 68881 run on turbo board 2500 iterations - 2499.9999999999 Time 0.48 seconds
Standard Whetstone run on turbo board - 68000 - KWhets/sec = 89	
Standard Whetstone run on standard Amiga A500 - 68000 - KWhets/sec = 75	
Standard Whetstone run on turbo board - 68020/68881 - KWhets/sec = 278	

Some benchmarks which show how much faster the 68020/68881 perform.

newer system L3 maths libraries check for the presence of the 68881 and use the chip if it is there. Unfortunately, older machines with L2 do not have this and the co-processor is more or less redundant unless code is written specially for it. Not many programs use the new maths libraries as yet and most other programs do not check for the presence of the chip. This makes any speed comparisons between an Amiga with the turbo board and one without very dependent on the 68020 facilities.

The board has a selection of programs which show its 'smarts'. The supplied Mandelbrot generator is, put mildly, fast; it should be, since most of the work is down to floating point calculations which are performed on the 68881. Other programs include two fractal landscape generators and some benchmark programs.

The demonstrations were reasonably good although they would not work on the standard Amiga. The benchmarks show the amazing difference the extra processor and co-processor can make. The Savage benchmark tests the speed and accuracy of tan, atan, exp, log and square root. The Whetstone gives an idea of the overall performance of the machine. I am a little wary of benchmarks, since they are very dependent on the compiler and the coding, though in this case the comparisons are a little more meaningful than usual.

At £439, is it worth putting 'go faster stripes' on your Amiga? That depends for what you wish to use the machine. If you are doing a vast number of calculations which involve floating point the 68881 is a dream come true. The 68020 improves the throughput of the Amiga dramatically and

its cache memory and flexibility should speed programs which use a good deal of the system hardware. The catch is that unless the program is using system L3 and its math libraries or is written specifically to use the 68881 the chip is a complete waste of space. The 68020 also suffers from this in that although Amiga code is supposed to be able to run it, the benefits are small unless the extra facilities are used. For this you will probably need an assembler which copes with 68020 instructions/mnemonics; any code written using the extra instructions will not run on a standard A500.

The turbo board is an expensive addition to the Amiga but if you want plenty of speed and do not care about portability or are just crunching numbers it will more than pay for itself; the speed increase is stunning at times.

CONTACTS

Animate Turbo Board from -
Amiga Centre, Scotland. Tel:
031 557 4242. Price £439.

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MC68020 32-bit Microprocessor User's Manual, third edition. Available from Motorola.

MC68881/MC68882 Floating Point Co-processor User's Manual, first edition. Also available from Motorola at Fairfax House, 69 Buckingham Street, Aylesbury, Bucks HP20 2NF. Tel: 0296 385252.

Floating Point Without a Co-processor, Byte, September/October 1988.

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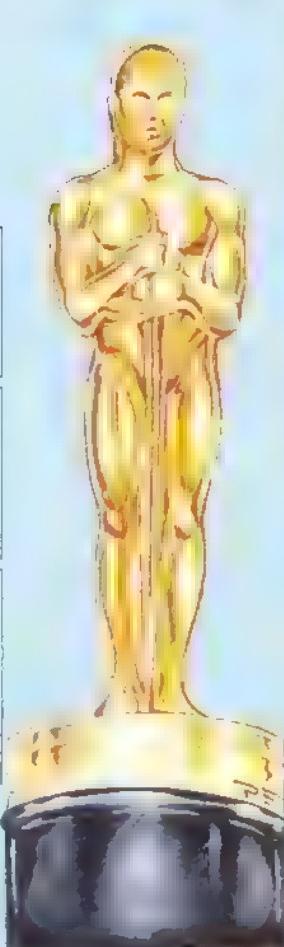
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The Amiga is a remarkable machine and, as you will see from other features in this special issue, it has outstanding sound, graphics and entertainment potential. How does it perform as a workhorse producing the letters and features which earn the money? Are its graphics features largely ignored or do they slow the processing of words to a snail's pace? Are its word processors ported-over versions of PC or ST software? To discover, we must delve deeper into the exceptional world of Amiga word processing and explore a different way of doing business.

When selecting an Amiga package you must first decide what is important to you and decide whether you need to mix text with graphics or if a selection of fonts is important. This will help you decipher the claims and counterclaims of the companies and disassemble the lists of features to unearth whether the package does what you want it to do.

Most Amiga systems use pull-down menus to select their various functions and commands but the inclusion of keyboard

shortcuts may be important to you if you find it a nuisance to take your hands off the keyboard to find the mouse every time you want to use a command.

I have restricted my selection to four packages, although there are many more available, like these, as imports through suppliers such as Amiga Centre Scotland, HB Marketing and PSSL.

WordPerfect

WordPerfect U.K.
£180

WordPerfect represents the old style of processing words and refuses flatly to include things like graphics and fonts, as text is restricted to the usual bold, italic and underlined. Having said that, it does what it does very well, as this no-frills word processor includes a comprehensive thesaurus and spellchecker which also provides suggestions based on the phonetic spelling of a word. Alongside packages such as Excellence it looks dated and expensive but for some users old habits die hard.

Kind Words The Disc Company/£45

Kind Words shows that you do not have to spend hundreds of pounds to get a fully-featured WYSIWYG word processor. A review of the latest version appeared recently in these pages and marks its further progression to a hybrid of word processing and DTP. Its highlights include a 90,000-word spellchecker, the ability to import and mix IFF graphics including those created by Deluxe Paint and the facility to include different fonts and text sizes on your pages. Kind Words also supports superfonts which ensure the printed output more than matches the screen display. It is in some part due to word processors such as Kind Words that full DTP packages must either merge or provide additional professional features such as colour separation to survive as an independent program.

Excellence Micro Systems Software/£190

The authors of the popular Scribble! have gone to town with this one and crammed anything and everything you could want in a word processing package. Not only does it support multiple text columns (1-4), a full WYSIWYG display including a page preview, 120 fonts in each document and the inclusion of low-, medium- and high-resolution IFF pictures but it also has a 90,000-word spellchecker, 70,000-word thesaurus, an interactive grammar checker which not only corrects your writing but also assesses its target audience from infant to PhD.

It also includes a calculate function which will provide the answer to complex formulae and the unusual support for text as well as graphics colour.

The package is ideal for people writing longer books, reports and documents as it will also produce indices and a table of contents automatically.

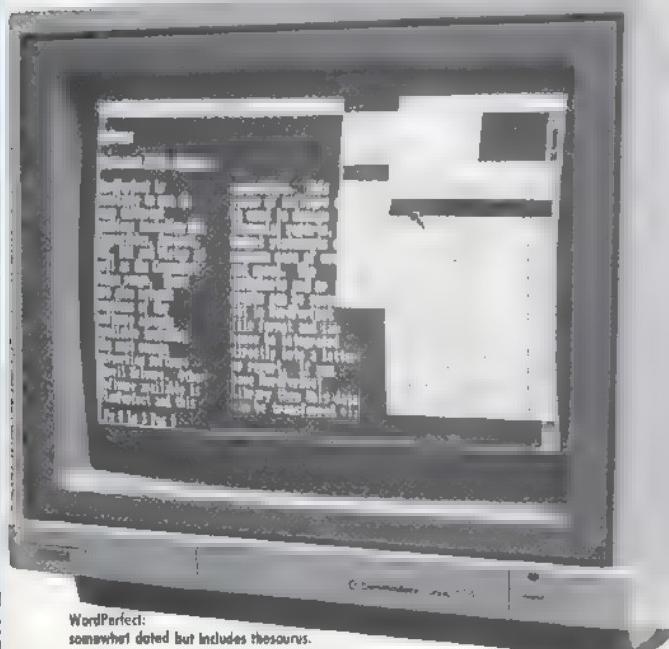
BeckerText Abacus/£88

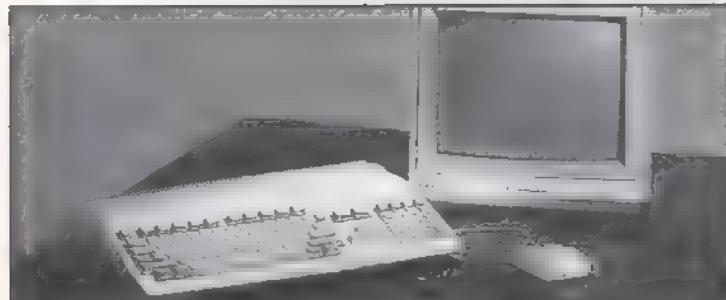
A mid-price package for mid-range needs. That is a fair way to describe BeckerText. It allows users to mix graphics with text which can be displayed in up to five columns. You can also include and calculate up to five columns of figures in kind of mini-spreadsheet, as you can add, subtract and multiply columns of figures.

The program also features a 40,000-word spellchecker and the ubiquitous WYSIWYG display but no additional fonts. It also includes an automatic index and table of contents, as well as the separate BT-Snap utility which can be used to grab Amiga screens, either full or in part, for inclusion in your documents. □

Word wise

Tony Hetherington knows his Amiga WYSIWYGs when it comes to word processors.





Feeling a bit IFFy?

All the major art/drawing packages for the Amiga allow you to read and write IFF picture files. IFF stands for Interchange File Format and it is a set of standards for storing various kinds of computer data. The standard, devised by Electronic Arts and adopted by Commodore, has caught on rapidly in the Amiga community because it enables data files to become portable.

IFF pictures are stored in a form called an interleaved bit map. Often the data will have been compressed and this, together with other IFF items, constitutes the picture file which will be stored on disc.

The files contain easily-recognisable sections or chunks and programs which read IFF data look for the header information within those portions to see whether the data is meaningful to them or not. This arrangement allows programs to ignore chunks they cannot or do not wish to handle which, in turn, provides for flexible interpretation; a program might read in an IFF colour cycling picture and interpret it as a static display by ignoring the appropriate colour cycling chunks.

IFF chunks start with a four-character identifier followed by a count which tells you the size of the chunk data - called the chunksize. Following that header information is the data. Picture files are stored in interleaved bit map chunks and they can specify a picture in terms of size, resolution and colour. ILBM chunks also include information which helps programs merge images into larger pictures; *DPaint* brushes are, in fact, mini IFF picture files.

An ILBM chunk will have various 'property' chunks embedded in it and one of the property chunks is called the bit map header. That describes the dimensions and the encoding of the image data; width, height, position of the image on the screen are all specified, along with such things as details of the compression technique used.

If 'image masking' is used it is also

age, DEST describes how to merge bitplane data into an existing picture which has more bitplanes available than the image data in question. SPRT identifies sprite images, CRNG/CCRT chunks provide colour cycling information.

Using the pixel data, which is stored in a BODY chunk, is difficult because the bitplane is interleaved and usually compressed. The picture data is stored as a series of video 'scanlines' and each scanline consists of the data from each of the bitplanes - figure one. This interleaved

Just what are the IFF files generated by Amiga graphics programs? Mike Nelson explains all.

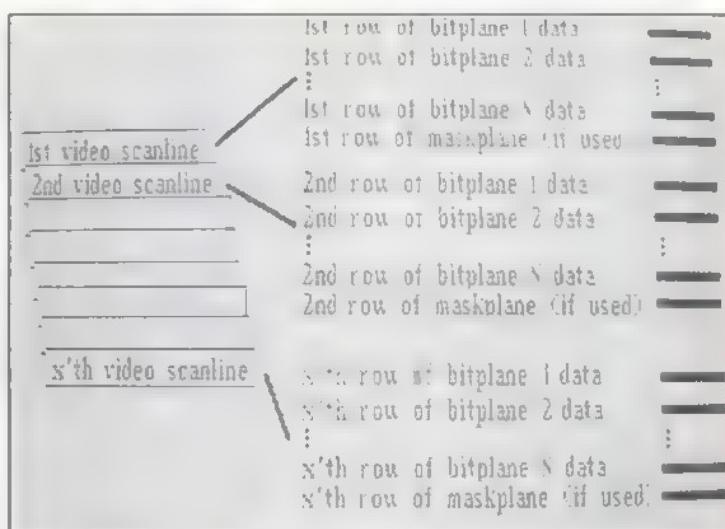


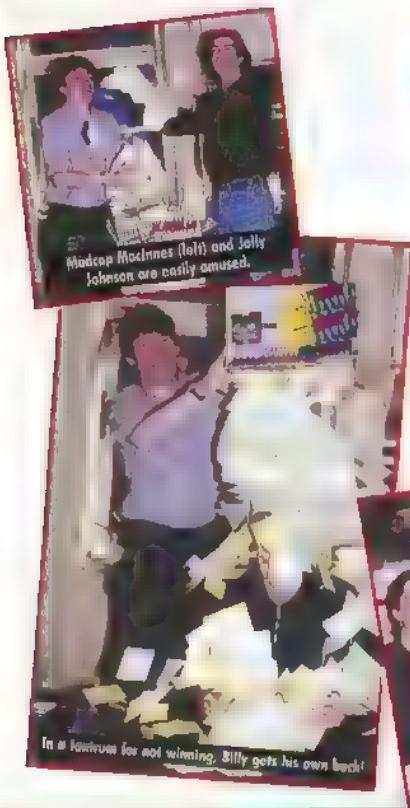
Figure 1. Layout for video scanlines in the ILBM BODY chunk.

described in the bit map header. A 'mask' is an optional bitplane which tells a program whether or not to move pixel data to a destination. Every bit in the mask thus identifies a pixel position in each of the real bitplanes.

A program can tell what colours should be used for the picture by looking for a CMAP - colour map - chunk. This provides information about how to set up the red, green and blue intensity values of the machine's colour registers. Other property chunks are also often found embedded, e.g., GRAB identifies a 'hotspot' within an im-

arrangement is adopted to ensure that all the data needed to produce a given scanline is kept together.

So that, in a nutshell, is what an IFF picture file contains. Why are they important? In short, they help make your data portable, moved easily between different programs; pictures can be created with one program, edited with another, even incorporated into word-processor reports. It is not just pictures with which the IFF standard deals: text, animation and music scores are all covered and they have one objective, to make life easier for the Amiga user. □



Reader and Pioneer Computing Weekly's super-suspect, Frightnight, has now popped his head up on a Friday. Mr D Jones of Southsea, Hampshire, Mr Jones wins a Pioneer video recorder, a nightflight video movie, a copy of the Frightnight computer game and a tape of horror movie-music.

The three runners up, who each receive £100 and a copy of the game are: Brian House of Holly Oak, Birmingham; Alan South of Finsbury, Manchester and R Soddy of Cheltenham, Gloucestershire. Well done to you all! And here are the answers that forced so many readers:

COMPETITION RESULTS

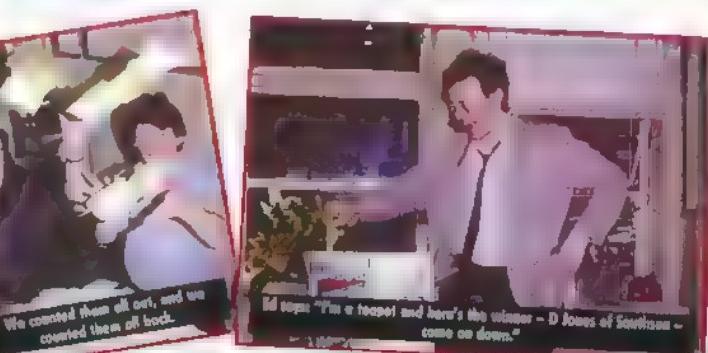
What's the name of the game that David Jackson beat?

David Jackson beat:

John Carpenter (left) started in 1974.

Grocer's

John Carpenter was a popular – but WRONG! – choice for Scanners but some of you thought Sonnette Fox starred in Vamp. Honestly.



WIN AN AVIGA!

1. Which video game is sponsored by Commodore?

- A. Charlton
- B. Wimbledon
- C. Chelsea

2. What is a commodore?
- A. Military governor of a fortress?
- B. Large South American vulture?
- C. Commander of a squadron of ships

3. From which country does Commodore originate?

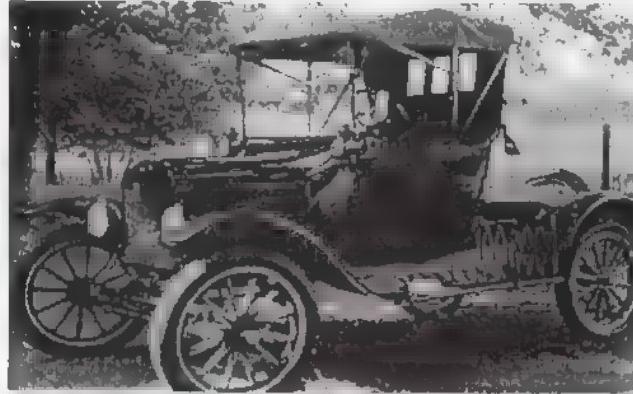
- C. United States



Rules: Closing date Friday June 9th 1989. Correct answers do not guarantee a prize. Names of winners will be published in a future issue of Popular Computing Weekly. The competition will be judged by the editor whose decision is final; no correspondence will be entered into. Multiple entries will be disqualified.

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La creme de la creme

Professional Page is the Amiga DTP package, with its impressive range of support for word processors and output quality second to none. Alastair McCann reports.

Desk-top publishing has been with us for several years and home and small business users have created newsletters, brochures and pre-printed forms using these graphical systems. Even the most artistic imagination is limited by the final output which falls short of professional standards even when printed on top quality dot matrix or laser printers. The difference is colour. Pick up any magazine and it is the use of colour which attracts your eye. The Amiga package *Shakespeare* gets close to professional standards but you need a colour dot matrix printer to use it and printing off every copy is unrealistic if you want more than 20 readers.

The processes used by magazines are created and simplified and brought into the reach of the home user via the Gold Disk *Professional Page*.

ProPage is a page-orientated DTP package which can be used to create a document or a magazine page by page from imported text and graphics files which are poured into definable and movable boxes. To speed the creation of larger documents you can define and save templates for odd and even pages and load them as required.

Templates can also be defined and saved to create a framework for each page of your magazine. They are similar to the blank artboards used in magazine production.

Writers then write their stories, features and articles using a variety of supported word processors including *WordPerfect*, *Scribble!*, *TextCraft*, IFF files and even ASCII files imported from other machines such as the IBM PC. The editor can read the files and check any spelling mistakes and add his corrections before adding the codes to determine how the text will look on the page.

In *ProPage* you can determine which font and point size to use - up to 127 pt. - and also justification and kerning - an advanced feature whereby some pairs of letters, such as Tu, naturally fit closer together, which gives the page a more compact appearance.

ProPage also supports four types of line spacing which are fixed - 12 point text in 14

point spaces; leading - 2.00, two points left between each line; and relative - 117 percent of the point size. These three definitions result in the same effect. The fourth spacing is paragraph spacing to allow extra space between paragraphs. This is a little more precise than the usual single - or double - line other packages offer and can be used to take into consideration the different typefaces. For example, one with long descenders needs less spacing than short, fat letters.

What makes a DTP page special is the inclusion of graphics and in *ProPage* it can mean either line drawings created with the limited drawing facilities of the program, scanned images using *Digiview*, grabbed screen images by using the grabbit utility

which can grab and store the screen of any program loaded from Workbench; or bitmap graphics imported from packages such as *Deluxe Paint* I and II.

The line-drawing functions have an interesting feature; they can be constrained so that the rectangle always produces squares and the ellipse option draws circles.

The text and graphics can then be pulled together as in the sample page which includes a bar chart drawn with the line options, a scanned image of the watch and the Gold Disk logo created by a separate graphics package.

It is then that *ProPage* leaves the others behind as you are free to use any of the Amiga colours by adjusting RGB sliders which calculate simultaneously the percentages of yellow, magenta, cyan and black to create that colour on a printing press.

You can print-out the page on a dot matrix or laser printer to check that all is well but also print-out colour separations containing just the yellow, magenta, cyan and black the printer will use to produce a printed version of colours seen on your Amiga monitor.

These separation printouts contain precision registration marks to ensure correct alignment and adjustable crop marks and can be printed-out on dot matrix printers, PostScript laser printers or professional typesetting machines for improving final quality.

Some printers already support *ProPage* and will give you a competitive price to create your magazine from a completed data disc and will provide bromides for black and white pages and chromalmins showing your colour. The cost of printing will vary with the number of pages and copies you require but should still fall within a club or small business budget.

At last you can create professional-looking documents on an Amiga, including full colour screenshots and illustrations. *Professional Page* is available in the U.K. from Digipro Ltd, tel: 0703 703030 and costs £249. □

Gold Disk



Sample page created using Professional Page including scanned images, imported text and graphics files and line drawings.

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JIM DENING

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ROLLING CHARACTERS - Amstrad CPC

Simon Goodwin

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This machine code program provides an unusual way of presenting text on-screen, to brighten your programs. Characters can be scrolled up, down, left or right, and wrap-

around on themselves to give a rolling effect.

Type in the Basic listing. The program will check the data you have typed-in. If you have made a mistake, an error message will be

displayed. If you have typed-in the data correctly three new Basic commands will be installed. You may want to save the machine code as a binary file. To do this type SAVE "rolchar",42000,420. To load this binary file type

MEMORY 41999:LOAD "rolchar",42000:CALL 42000

Five RSX commands are added to Basic. Typing :HELP will list the commands and their syntax. The other four commands are:

:IP xy
:DOWN xy
:LEFT xy
:RIGHT xy

Each command rolls the character at co-ordinates xy in one of four directions, one pixel at a time. Repeating the command eight times will cause the character to wrap-around to its former state.

Unfortunately these commands work only in MODE 2.

Listing one shows various ways of using the new commands:

Listing 1

```

10 MODE .
20 PLOT 228,236,1:DRAWE 150,0:DRAWE
   0,22:DRAWR -150,0:DRAWE 0,-22
30 LOCATE 30,10
40 PRINT "How about this?"
50 FOR t%=1 TO 80
60 FOR n%=30 TO 45:UP,n%,10:NEXT
70 NEXT t%
80 LOCATE 30,10
90 PRINT "Or this?"
100 FOR t%=1 TO 80
110 FOR n%=30 TO 38:DOWN,n%,10:NEXT
120 NEXT t%
130 LOCATE 30,10
140 PRINT "What do you think?"
150 FOR t%=1 TO 160
160 FOR n%=30 TO 34:LEFT,n%,10:NEXT
170 FOR n%=35 TO 36:UP,n%,10:NEXT
180 FOR n%=38 TO 40:DOWN,n%,10:NEXT
190 FOR n%=42 TO 47:RIGHT,n%,10:NEXT
200 NEXT t%
```

Listing 2

```

60 MEMORY 41999
70 linenumber=210:address=42000
80 FOR n=1 TO 53
90 count=0
100 FOR i=0 TO 7
110 READ a$:POKE address,VAL("&" + a$)
120 address=address+1
130 count=count+VAL("&" + a$)
140 NEXT i
150 READ check$:check=VAL("&" + check$)
160 IF count<>check THEN PRINT
   "Error in line";linenumber:END
170 linenumber=linenumber+10
180 NEXT n
190 CALL 42000:PRINT "Initialised"
200 END
210 DATA 01,86,A5,21,1E,A5,CD,D1,3AE
220 DATA BC,C9,CD,D5,A4,22,1C,A5,4AE
230 DATA 2A,1C,A5,11,0C,A5,06,08,1BB
240 DATA C5,7E,12,01,00,08,09,30,197
250 DATA 04,01,50,CO,09,13,C1,10,202
```

```

260 DATA EF,2A,1C,A5,11,0C,A5,3A,2D6
270 DATA 13,A5,77,01,00,08,09,08,147
280 DATA 07,C5,1A,77,01,00,08,09,16F
290 DATA 30,04,01,50,CO,09,13,C1,222
300 DATA 10,EF,C9,CD,D5,A4,22,1C,44C
310 DATA A5,2A,1C,A5,11,14,A5,06,280
320 DATA 08,C5,7E,12,01,00,08,09,16F
330 DATA 30,04,01,50,CO,09,13,C1,222
340 DATA 10,EF,2A,1C,A5,08,07,C5,2BC
350 DATA 01,00,08,09,30,04,01,50,97
360 DATA CO,09,C1,10,F2,3A,14,A5,37F
370 DATA 77,2A,1C,A5,11,15,A5,06,233
380 DATA 07,C5,1A,77,01,00,08,09,16F
390 DATA 30,04,01,50,CO,09,13,C1,222
400 DATA 10,EF,C9,CD,D5,A4,01,00,40F
410 DATA 08,ED,42,05,08,C5,01,00,20B
420 DATA 08,09,CB,0E,C1,10,F6,C9,37A
430 DATA CD,D5,A4,01,00,08,ED,42,37E
440 DATA 08,08,C5,01,00,08,09,CB,180
450 DATA 08,C1,10,F6,C9,DD,6E,00,3E1
460 DATA DD,68,02,2D,25,CD,1A,BC,33A
470 DATA C9,CD,F5,A4,08,08,21,22,380
480 DATA A5,C5,0L,00,A5,23,CD,F5,4C1
490 DATA A4,C1,10,F5,C9,3E,0D,CD,44B
500 DATA 5A,BB,3E,0A,CD,5A,BB,C9,40B
510 DATA 7E,FE,23,28,06,CD,5A,BB,3AF
520 DATA 23,18,F5,C9,00,00,00,00,00,1F9
530 DATA 00,00,00,00,00,00,00,00,00,0
540 DATA 00,00,00,00,00,00,00,00,00,0
550 DATA 00,00,54,68,65,20,68,6F,213
560 DATA 6D,6D,61,6E,64,73,20,61,301
570 DATA 72,65,20,3A,23,23,7C,55,248
580 DATA 50,2C,78,2C,79,2E,23,7C,266
590 DATA 44,4F,57,4E,2C,78,2C,79,281
600 DATA 2E,23,7C,4C,45,46,54,2C,224
610 DATA 78,2C,79,2E,23,7C,52,49,285
620 DATA 47,48,54,2C,78,2C,79,2E,25A
630 DATA 23,23,41,6C,6C,20,63,6F,251
640 DATA 6D,6D,61,6E,64,73,20,75,315
650 DATA 73,65,20,63,68,61,72,61,2F7
660 DATA 63,74,65,72,20,63,6F,2D,2C0
670 DATA 6F,72,64,73,2E,23,97,A5,345
680 DATA C3,5B,A4,C3,1A,A4,C3,CO,4C6
690 DATA A4,C3,AB,A4,C3,E1,A4,55,553
700 DATA D0,44,4F,57,CE,4C,45,46,35F
710 DATA D4,52,49,47,48,D4,48,45,35F
720 DATA 4C,D0,00,00,00,00,00,00,00,11C
730 DATA 00,00,00,00,00,00,00,00,00,0
```


Flow control

Ah, summertime is nearly here. Sunshine, cricket, wonderful cricket and hundreds of people sitting around in airport terminals.

Never mind security, never mind noise; nothing worries politicians so much as the prospect of 737 loads of voters sitting with nothing better to do than write sarcastic letters to their MPs.

After last year's debacle the powers that be decided that something must be done — or rather they have located some likely scapegoats. The problem last year was the striking Air Traffic Control Officers and flow control. Flow control is a system which allocates time slots to aircraft when there will be enough spare capacity throughout the proposed route for the aircraft to be handled safely.

It is a complex system which is worked out months in advance. Miss your slot and you could be due for a long wait on the sheltering tarmac. It can be a frustrating process for all concerned. Many pilots complained that when they finally got off the ground, the skies were virtually empty. So how can the capacity of the system cope with the ever-growing demand for both scheduled and charter flights? Is the use of computers and advanced avionics the key?

Advanced avionics

Although not a short-term solution, there are various developments which may help but, like all computer applications, it will take a long time to develop to the level of safety and reliability demanded in ATC work. To make matters worse it must be drafted on to a live system which must work 24 hours a day.

In Britain, the Civil Aviation Authority has produced the rather uninspiringly entitled Central Control Function. This means centralising the radar facilities of several airports in the London area and redesigning the air traffic corridors in which aircraft fly into and out of the airports. That, it is hoped, will increase capacity by decreasing the amount of time ATCOs have to spend co-ordinating flights, i.e., passing an aircraft from one to another.

This approach has been made possible by

the use of plot-extracted radar displays. No longer do radar operators have to sit in the dark peering at the screens. Now a computer processes the raw radar returns and displays the aircraft as discrete symbols.

A more radical system is emerging as the standard of avionics in aircraft improves. No flight deck is complete without its flight management unit and navigation system which uses inertial navigation and will soon use the satellite-based global positioning system. At the moment aircraft are restricted to airways — routes between two navigational beacons. In future, it may be possible for aircraft to fly direct from point A to B.

Global positioning

Clearly the prospect of aircraft approaching ATCOs from all over the place would be a little alarming. So why not get rid of the human altogether? The logic goes something like this. The aircraft has a

highly-advanced computer and navigation system on board, the computer on the ground has its plot-extracted radar information giving the aircraft position, so why not let the two computers sort it out between them?

This, the supporters argue, would also allow 4D navigation to be used where the ATC computer not only gives the aircraft a course and height to steer but also gives the autopilot a speed at which to fly. This, it is hoped, means that all the aircraft line up in a neat and orderly queue to land on the precious airport tarmac which, because of bureaucratic inertia and red tape, will be in very short supply at the beginning of the next century, so that is used to maximum capacity.

Fuel-efficient

Obviously the system requirements are demanding; operators will demand that such a system allows their aircraft to fly in the most fuel-efficient manner. Possibly, though, such demands may be tempered by the prospect of dispensing with all that fuel-burning stacking. Taking humans out of a safety-critical loop is always a path fraught with problems. The bottom line is that many people have little faith in computer systems, often with a good deal of justification.

Until then, it will be business as usual while the present system lurches between caution with long delays and the other extreme with the usual six-inch tabloid headlines about near-misses. □



ARCADE

ACE



These days, playing vids in the centre of London can be a real pain. Worst of all must be the London Amusement Centre in Oxford Street where it is 50 pence a time – and that is just the cabinet games. Play a sit-in and you have kissed goodbye to £1. For a real session, you do not take the Underground to the arcades any more – you ring up Securicor.

Partly I guess it must be the fact that machines are becoming more expensive for operators to buy. That is why initiatives like the Sega System 24 can only be a good thing. It is a unit which, instead of having to buy a new circuit board when you change games, you just buy the game on a disc, together with a security chip to prevent copying, and load it.

Assuming the hardware is good enough – and the base System 24 unit is well specified – in the long run this might mean cheaper games and more variety in the arcades, too. At the moment, the investment needed to produce both the software and hardware means that games companies are scared to take risks, which produces the hundreds of forgettable shoot-'em-up and beat-'em-up clones you see in

the average arcade.

System 24 has not made an astonishingly flying start. The two games produced for it so far have been fairly ordinary. First, there was a vertically-scrolling shooter called *Scramble Spirits*; then followed the interesting but unspectacular *Gain Ground*. Now, Sega has something a little more interesting, *Crack Down*.

Those mad scientists have been at it again, producing artificial life. *Crack Down* shows they were only practising, however, as the butch-looking military-type result shows.

Here they are, holed up in this fortification, fanatically following this evil leader person and you, or you plus a friend, are the only ones who can prevent them enslaving the world!

The screen is divided into three parts. The top third all the way across the screen is a highly-

detailed radar, showing you the whole of the current level. On it you will see a number of red crosses. On them you must place a time bomb and, when all the time bombs for the level are set, you get the hell out of it because, being time bombs, they blow up after a time. In this case, short.

The lower portion of the screen is split in half, left and right. If you are playing one player, they show the same thing, a Gauntlet-style view of the immediate area, with you in the middle. If there are two of you the other one shows the area round your buddy. Both screens scroll completely independently.

Two things make the task difficult, other than the obvious pressure of time. First, the levels are inhabited by guards, who are by no means friendly, and second, your ammunition is limited. You can pick up extra lying round the level but often you have to revert to martial arts and try to kick them to death. Which is a pity as most of them have guns.

To make things very tricky on the later levels there are traps to catch you out like huge pendula past which you have to time your run accurately if you are going to make it without serious subtraction of limbs.

To even things a little you are equipped with one or two smart bombs – or should that be neutron bombs? – which will take out everything on your screen.

A fair one-player game, much improved by a human companion, *Crack Down* shows that the Sega designers are only just getting into their stride with the System 24. The best is almost certainly yet to come but this is as good as it gets now.



• Top left, anyone remember Raiders of the Lost Ark? Above, reminds me of my car.

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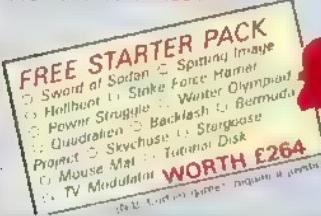
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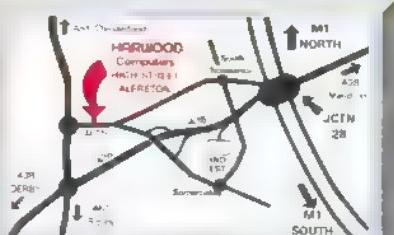
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J Morley of Blackpool, Lancs, writes:

Q I am writing a game in machine code for my Spectrum and there are some sections of it I would like to be able to run very quickly. Can you advise me how to make my program run as fast as possible?

A The first place to look is at sections of the program which are performing loops, i.e., repeated sections. They take up most of the processor time and must be optimised to run as quickly as possible so that the whole loop runs faster. The way to do this is to look in your Z80 machine code manual for a table which gives the number of cycles required by each instruction. There are generally a variety of ways of getting the required result and picking the instructions which use the least number of cycles will give you the fastest method.

Microprocessors are ruled by clocks and timing. Each instruction usually requires a fetch from memory, some operation on the data and possibly a store back to memory. Each of the sections requires a cycle or more, with the most time usually being taken with moving data to and from memory. If possible, try to use the internal registers - A, BC, DE, HL - for operations as much as possible. Since no memory accesses are required and everything is performed on chip, things should run much faster than the memory-intensive method.

If you find that even after optimising the number of cycles the code is still too slow, look at the algorithm you are using; an al-

gorithm is a sequence of instructions or processes which, when put together, form a more complex instruction or process. There may well be a way of cheating so that the code runs faster. For example, persistence of vision can be used to make graphics appear to move smoothly when, in fact, they move jerkily.

There is no point in moving a sprite through every pixel as it goes across the screen - it can jump two or three or possibly more when it is at top speed; the persistence of the image on the eye and the screen phosphors will make it appear to be smooth.

Another improvement area to take into account when performing graphical manipulations is that the screen is updated only every 1/25th of a second. If you are updating the screen at a higher rate you are wasting processor time which could well be used on other things.

There are many other instances where optimisations can be performed but they tend to be rather program-dependent and you will have to spot them for yourself. I find that there are times when it is better to switch off the computer, use a pencil and paper - something on which the computer revolution has yet to improve - and work out the problem the hard way, looking at every possibility until the fastest method is found.

C64 clean-up

P Rogers of Skelmersdale, Lancs, writes:

Q In reply to Jones of Newport, I went who was having trouble with his Commodore 64 keyboard. I have had a C64 for more than six years and in the last 12

Amstrad mono

Alan Jacobson of Wrexham, Chwyd, writes:

Q Would I be correct in saying that if I connect the left and right channels of my Amstrad sound output I will get mono? Will doing this cause problems to the hardware and, if not, can you show me a diagram of how to wire it so that I can connect to a tape recorder?

A You can connect the channels to get mono - see diagram - and, so far as I know, it will do no damage to the Amstrad.

months my keyboard has had this problem on some keys, e.g., SHIFT CLR/HOME mainly.

I found that the cure is to clean the contacts between the keys and the printed contacts. You must remove the keyboard from the top and then all the small screws. Wash the contacts with some spirit and a cotton bud. You cannot remove the two halves of the keyboard completely unless you desolder the SHIFT/LOCK wires. Replace everything in reverse order when the contacts are clean. This has worked each time for me.

A Thank you for the tip.

Amigabasic auto-run

Jason Pearce of Rother, Lancs, writes:

Q Do you know if it is possible to make my Amiga 500 auto-run an Amigabasic program? I would like to be able to put the disc in the drive and switch on the machine. From there, I would like my Basic program to auto-run without any "user intervention". I would be grateful for an explanation if it can be done.

A When the Amiga boots it looks in directory's for a file called start-up-sequence. The instructions in this are followed automatically at start-up time. All you need to do is include the following line in the file:

amigabasic filename

where filename is the name of the Basic program you want to auto-run. This line will cause the Amiga to load Amigabasic and the filename and run it. The file should have been saved in normal compressed form, i.e., not with the .A suffix.

You can edit start-up-sequence by going into Amigabasic and then loading s/start-up-sequence. Insert the line:

Amigabasic filename
as the last line and the save the file. Make sure that the file Amigabasic and the program filename are in the root directory, the top-most, and you should have no trouble.

ST headers

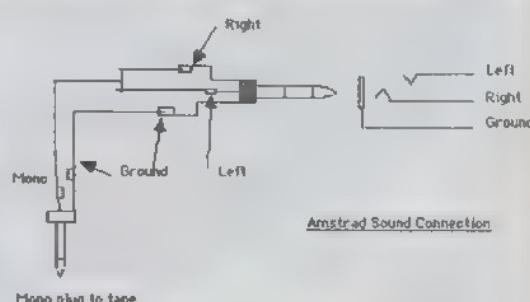
Joseph Hardy of Exeter, Devon, writes:

Q I have noticed in many of the articles and replies you have done regarding the Atari ST through the years that you always include a header for machine code programs. I would like to know if this is necessary or can it be omitted and the program run as normal? Also, what does it do?

A The header is used to allow the program and the ST to manage the memory correctly. I have added comments to your listing which should explain what the instructions do in detail.

Since GEMDOS and TOS can hold a number of programs in memory simultaneously it is necessary to tell the system how large the program is and to hand back any unused memory to the system. When a program is loaded it has the whole of the available memory to play with. For the first program this is around 512K minus about 64K for the system and 32K for the screen - the 1040STs and larger obviously have more. Since most programs are not really very large there is room in the memory for other programs or desk accessories.

All programs are made up of a number of sections and the first



Amstrad Sound Connection

Diagram shows the memory layout. This starts with the base page which is a section attached to the program by the system when the program is loaded. Diagram two shows the contents of the base page starting at the bottom with the start address of the program in memory; the system loads the program at the next free position and then passes the information along via the base page. Following this is a long word which defines the end of the program, i.e., where the next program may be loaded or next free space.

The first diagram shows that the program is split into three main areas - the Text or the main executable program, the defined Data and the undefined data or BSS. Many assemblers allow data to be placed in the different areas with the SECTION command - SECTION DATA or SECTION BSS and so on. The DATA area is used to hold global data for the program and its use means that data is all held in one area, no matter where it is defined in the program, similar to a Basic program.

The BSS is uninitialised data - it is undefined when the program is loaded and is set to zero. This has the advantage of taking no disc space, since all which needs to be known is its length. The DTA is the disc transfer address used by the disc directory system calls and is normally re-set within a program using the SETDTA (\$1A) system call.

If the program was loaded from another, i.e., with the EXEC call, the next address points to the calling program, or parent's, base page start. The environment string is usually zeros and the command line is the text entered with TTP-type programs. The program starts at the 256th byte of the base page.

The header determines the total length of the program by extracting the relevant data from the base page. It then uses this and the

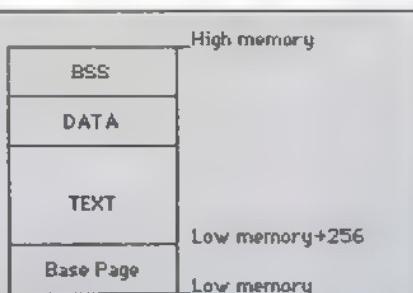
START	MOVE.L	A7,A5	Save current stack pointer in A5
	MOVE.L	*USTK,A7	Set up a new stack internal to the program
	MOVE.L	4(A5),A5	Get the programs load address (base page)
	MOVE.L	\$C(A5),D0	Start plus 10 is length of program area
	ADD.L	\$14(A5),D0	Start plus 20 is length of initialised data area
	ADD.L	\$1C(A5),D0	Start plus 26 is length of uninitialised data area
	ADD.L	#\$100,00	Add the length of the base page (256 bytes)
	MOVE.L	D0,-(SP)	And stack the resulting length of the program
	MOVE.L	A5,-(SP)	Stack the start of the program
	MOVE	D0,-(SP)	Stack a word, any word since its a dummy
	MOVE	\$4A,-(SP)	GEMDOS code for selflock
	TRAP	#1	Tell system that we want this (D0) bytes starting at (A5)
	ADD.L	\$12,SP	Clean stack up - system has got back any unused memory
	BSR	GO	Branch to main program which ends with RTS
	MOVE	0,-(SP)	GEMDOS code to terminate the program and give back
	TRAP	#1	The memory set aside for it
GO		
	RTS		Main program is here
USTK	DS.L	100	And ends with this
	DS.L	1	Set aside 100 longs for internal stack
			Starting here
			ST header program with comments.

Diagram 3

program start address, which was pushed on to the stack by the parent or system, to reserve an area in memory for the program. The rest is passed back to the system for possible re-allocation. If the header is not included the program has the whole memory available for use, apart from those sections required by the screen and system.

Whether the header is put in or not depends on whether the program is to call other programs or set aside areas of memory with the allocate system calls. If it is not doing any of those things there is no need to have it. On the other hand, it is convenient when writing machine code programs to set up a file which contains the header, the USTK area, and any standard include files. Then every time a new program is written much of the set-up work is already done.

Command line start	128-255
Pointer to ENV	44-47
Unused	40-43
Parent's BP address	36-39
DTA address pointer	32-35
Length of BSS	28-31
Base address of BSS	24-27
Length of DATA	20-23
Base address of DATA	16-19
Length of TEXT	12-15
Base address of TEXT	8-11
Base address of TEXT	8-11
End address of TPA+1	4-7
Base address of TPA	0-3



Memory layout of a program.

Diagram 2

Memory layout of ST program base page.

Diagram 2

Characterless

I am writing to you in sheer desperation after reading your review of the Panasonic KX-PT124 in the May 4th issue of *Popular Computing Weekly*.

I bought this printer some six weeks ago and, despite Locomotive's assistance, plus as much help as the store from which I bought the printer was able to give, I am still struggling to get it to do what I think it should!

I have an expanded Amstrad PCW826, using Locoscript 2, the appropriate printer driver files and character files.

As I am sure you know, Locoscript 2 supports hundreds of different mathematical, textual and other symbols, and according to the printer manual I should be able to print these from the software commands—in particular the

mathematical symbols and accents, which is the main reason I bought the printer. Despite many different combinations of initial set-up and control panel settings I'm simply getting blank spaces.

Please can you help?

S. Dunlop, Southsea

You need two more things to get this printer working as you want it to. First, says Howard Fisher at Locomotive, you need one of their special mathematical printer drivers ("a snip at £24.95"). Second, you need a printer buffer expansion, the 32k "KX-43P" costing around £65 from Panasonic. This will give your printer enough memory to handle all the complex graphics involved in producing your characters. CPU Peripherals, on (04862) 23411, sells the buffer expansion unit.

Twaddle

Ron James' letter of 20th April regarding over-protection of computer software was the biggest load of twaddle I've ever read in the letters page.

As yet, no amount of protection will thwart the dedicated hacker and so all software is at risk. But hackers are the minority of computer users. The idea behind protection is to stop people like Mr James easily making copies and tempting him to just as easily slip his friends a copy at the same time and deprive a software house of its due reward.

Protecting a program does not introduce bugs into it. Goodness knows where James got that little gem from.

He mentions damage to computer equipment resulting from protection. There is only one situation where I can see this happening. This is in protection of a C64 disc program where deliberate errors are put on a disc to



"I've heard about the chip shortage but this is crazy."

prevent a standard backup program from copying it. What often results is that the 1541 disc drive promptly goes and bangs its head against the drive stop to make sure it is reading track one. Any resulting mis-alignment of the head is, in fact, the fault of the drive design. This also occurs when discs are formatted and so will inevitably happen anyway.

G. Migne, Southampton

Ignored XE

I own an Atari 130XE which is the 128k version. The XE has never had the support it deserves from software houses and even Atari itself. Both parties seemed to push the XE aside when the ST was launched.

The XE is far superior to the Spectrum, C64, BBC and Amstrad CPC in the hardware stakes. The sound chip in the EX-Pokey is even better than the ST's one. It also has a customised graphics chip—GTIA—and in games scrolling is always very smooth.

So why is the XE ignored? I think one of the main reasons is because Atari did not advertise the machine, unlike the ST which is always being promoted.

T. Booth, Echingham, East Sussex

Useless

Software houses say they will go out of business if software piracy isn't stopped. Does this mean we will no longer see the endless rows of shoot-em-ups, film tie-ins, coin-conversions, and other such "original" software on our shelves? If this is the case, then let's bankrupt them, and make it snappy! It's about time there were some new ideas in the software industry (such as *Populus* and *Nebulus*). I often "crack" software (such as Speedball, Bubble Bobble, etc.). I also copy software off my friends, and they copy mine. Being an 'A' level student, I can't really afford to spend £24.95 a time on useless software. I do buy some original software, but only if it's worth it. Examples of these are *Dungeon Master*, *Despac*, *Starglider*, and other superb pieces of software.

J.D., Wolverhampton

If you reckon they are useless, why crack them?

NEXT WEEK

On sale Thursday, May 25th

A3000 Review

Kenn Garroch reckons the new Acorn A3000 makes the ST and Amiga look totally silly. Catch his in-depth and definitive review next week!

Computer dating

No, not getting amorous with your Amiga but finding the love of your life through a computerised bureau. Does technology add to the romance or is it another tacky gimmick?

Shareware

Get a complete office system running with only a few pounds spent on software. We begin with a series on shareware with a look at PC Write and PC File.

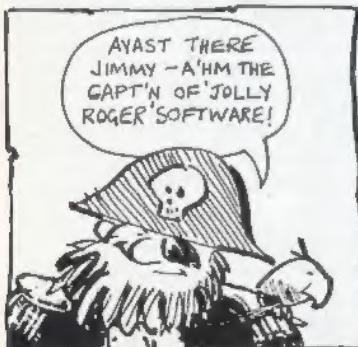
Ray Tracing

Mr Tracing has been toying with a beginners art package called C-Light, which teaches the skills of ray tracing to Amiga graphics newcomers.

Gamesweek

Something special for adventure fans.

INTERFACE BY BRIAN COOKMAN



YOUR OBJECTIVE IS VERY SIMPLE BUT FAR FROM EASY: TO BECOME A SUCCESSFUL, AND PREFERABLY NOT DEAD, COSMIC PIRATE.



"Every detail of this package is well considered
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